ZX COMPUTING MONTHLY

An Argus Specialist Publication

JULY 1986 £1.50

FOR ALL SINCLAIR USERS

Soundcheck: Spectrum music software

Keyboard survey

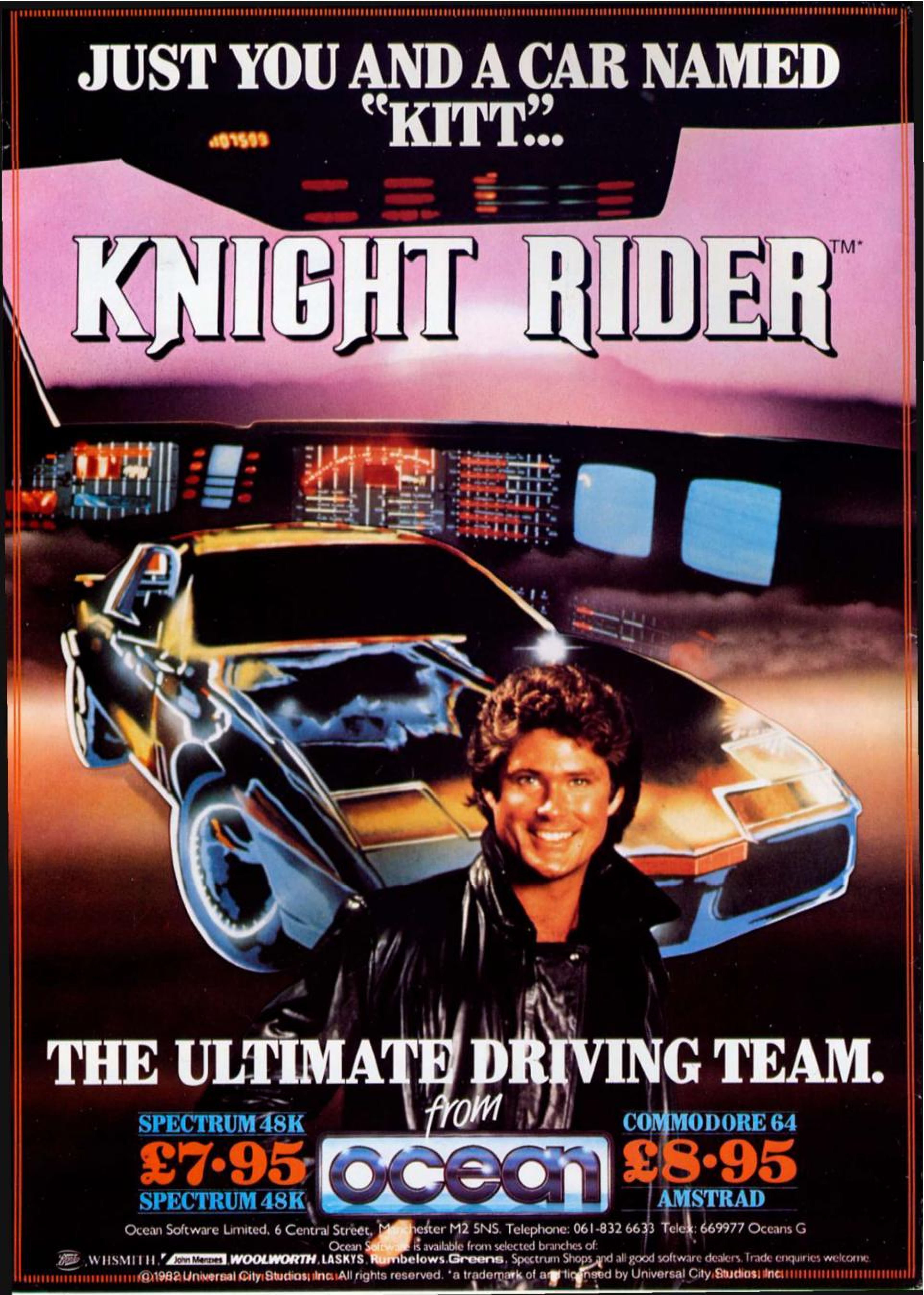


So you want to be a programmer?

Quazatron author Steve Turner shows the way

Reviews: Pentagram △ Superbowl △ Young Ones △ Price of Magic

Competitions: Biggles △ Graphic Adventure Creator △ Citizen Printer


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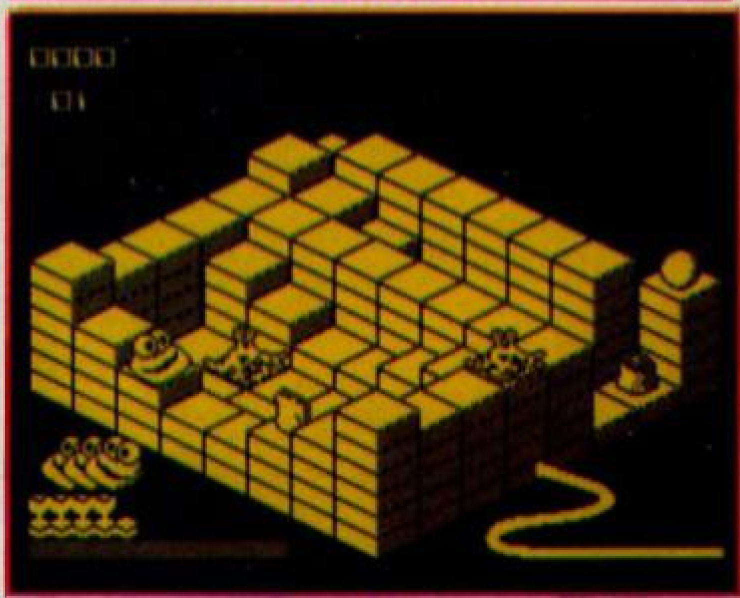


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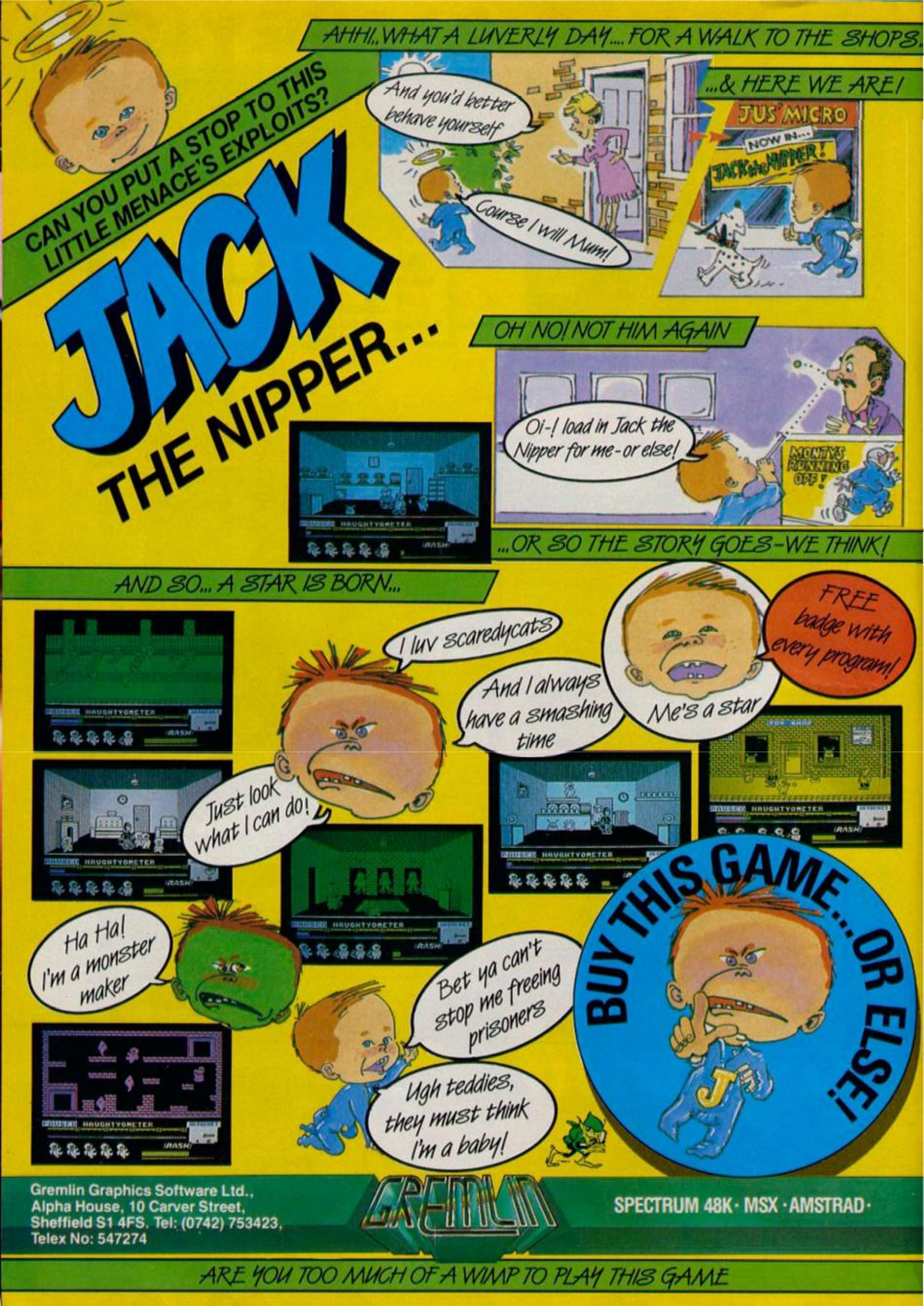
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Assistant Editor: **Cliff Joseph**
Consultant Editor: **Ray Elder**
Advertising Managers: **Peter Chandler** and **John McGarry**
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CAN YOU PUT A STOP TO THIS LITTLE MENACE'S EXPLOITS?
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AHH!..WHAT A LUVERLY DAY.... FOR A WALK TO THE SHOPS.
And you'd better behave yourself
Course I will Mum!
...& HERE WE ARE!
JUS' MICRO
NOW IN...
JACK the NIPPER!
OH NO! NOT HIM AGAIN
Oi-! load in Jack the Nipper for me - or else!
MONTY'S RUNNING OFF!
...OR SO THE STORY GOES-WE THINK!
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ARE YOU TOO MUCH OF A WIMP TO PLAY THIS GAME

N·E·W·S

Virgin Territory

The Virgin Games empire, swollen by the acquisition of New Generation Software and Leisure Genius in recent months is set to unleash some promising titles including the official Scalextric game, the long awaited Dan Dare and the Virgin Atlantic Challenger game based on the exploits of the ubiquitous Richard Branson.

Nick Alexander, Virgin's managing director, explained why Virgin had adopted the 'acquire to survive' strategy.

"We see the software market very quickly developing into a situation where there are perhaps six to 12 software houses who become software publishers representing a whole range of different labels.

"The reason this is happening is that wholesalers and distributors are controlling the market at the moment at the expense of the software producers.

"If a company like us can acquire other labels it means we are in a position to talk to retailers directly and have a bigger influence on what goes on the shelves."

Virgin's expansion is not likely to stop with the snapping up of New Generation (Machine Code Tutor, Jonah Barrington Squash, Trashman) and Leisure Genius who had the licensing rights to Scalextric, Cluedo and Monopoly. In the pipeline are Now Games III, Scalextric (September release) and imminently, to coincide with the Virgin Challenger's transatlantic record attempt, a game that takes you to the heart of Virgin territory.

"It's going to be a fun arcade simulation with Richard running about in frantic efforts to keep the entire empire running smoothly."

Sadly, Virgin's Spectrum releases will not include the game of James Clavel's novel Shogun.

"Unfortunately it's proved impossible to cram the game onto the Spectrum. There are about 40 different characters all trying to subvert each other to achieve power and it's a very complicated piece of coding."

There are no plans for a Spectrum 128 version. "With a new machine you are looking at long development times and until there is a larger user base it doesn't add up. Long term survival in this business depends on limiting the amount of risks you take."

Scheduled for release in August is Dan Dare, a game whose development has been bedevilled with problems and delays, so much so that some suspect the Mekon must be responsible. However, a look at the unfinished version is proof enough that the wait will be worth it, as Dan Dare features stunning graphics, which are almost alien to the Spectrum and level upon level of frenetic action.

The Mekon has aimed a hollowed out asteroid at the earth and Dan must break into the control room and set off the self destruct mechanism before the world is blown to smithereens. There are over a 100 screens swarming with five kinds of Treens, the Mekon's minions, who will imprison Dan in the isolation cell given half a chance. Lift shafts connect the different areas of the complex and they may be the safest place as the corridors are lined with gun ports set into the walls.

The presentation of the game is designed to be as faithful to the original cartoon strip as possible and captions come up to keep you aware of the Mekon's intentions. In the bottom right hand corner of the screen is an animated picture of the Mekon's face and you can look forward to a confrontation with the Mekon towards the end of the game.

As for the software industry's future, Nick Alexander feels there are real grounds for optimism.

"I think the signs are healthy and we've passed that point where games are looked on as just a fad. With the cutting down of the number of software houses there will be less product but it will be easier to present it to the public, and with a return to profitability there's the opportunity to start taking a few risks and hopefully bring in some innovations. Like compact disc ROMs and compact disc interaction — there are a lot of creative opportunities there."

Pausing for a moment to ponder on whether compact disc technology would leave the Spectrum back in the stone age of computing, Nick added, "Someone somewhere is bound to bring out a compact disc interface."

Cartoon Competition winners

Our cartoon competition in the April issue attracted a good number of entries from budding cartoonists. The winners each receive a copy of Kipper Williams Warning: This Computer Bytes from Javelin Books. And the first prize winner, Kevin Curtin from Nairn in Scotland, also wins an original Kipper Williams cartoon for his picture of the menacing dragon. Runners up are Robert Windebank for his mutated Spectrum user, Paul Brady from Rickmansworth with his computer surgeon, Wexford reader Kingsley Fleming's Sinclair mechanic and Glasgow duo Richard Currie and Hamish Buchan for their petrified mouse.





Return of the Thingie (and other games)

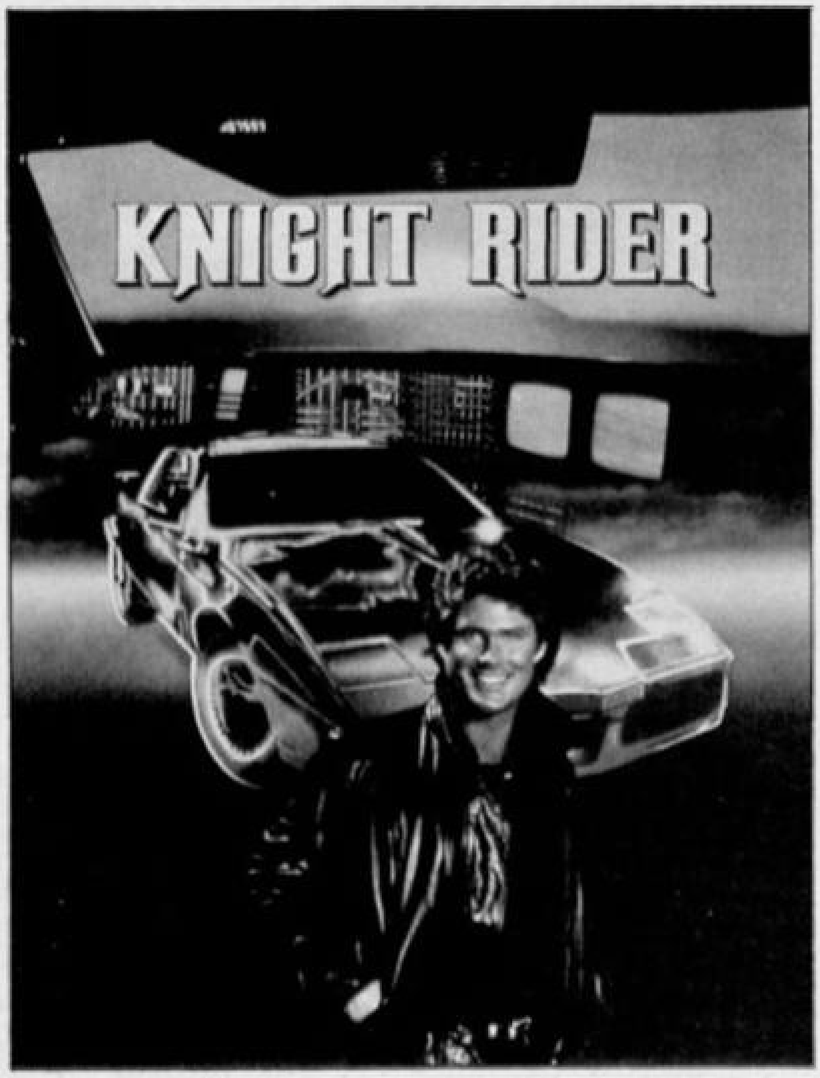


Perhaps as a reply to Melbourne's re-released Hobbit, CRL have decided to go ahead with the release of The Boggit. Bearing absolutely no connection at all to MH's game, The Boggit features the adventures of Bimbo Faggins in a tepid (or should that be epic?) trek across the Wiffy Mountains, Berkwood Forest and Anadin River. A graphic adventure with over 100 locations, Boggit should be available any minute now for £7.95.

Not content with demolishing the reputation of J.R.R. Tolkien, CRL are also in cahoots with the chapesses of St Brides in producing The Very Big Cave Adventure, a spoof version of the original Crowther and Woods Colossal Adventure, and also in the pipeline is Academy — the sequel to their earlier mega-game, Tau Ceti. Academy is still quite a long way off, but planned for a June/July release is They Call Me Trooper. And not content with demolishing one Melbourne House game, CRL describe Trooper as "like Way of the Exploding Fist — but with a game behind it."

The longest Knight

Also threatened for June and July are the eternally awaited trio from Ocean; Knight Rider, Streethawk and Hunchback — the Adventure. Knight Rider, according to Ocean, is now finished and on its way, whilst the other two are on the final stages and should be with us in July. All three titles will cost £7.95, and if you're interested it's now over a year since Knight Rider ads first started appearing. Still, as a result of the not terribly good publicity they've had because of this, Ocean now say that they're going to be more careful about advance advertising from now on . . .



A quick plug



Our news pages just wouldn't be complete without a picture of one of those plug things that are designed to stop mains fluctuations from blowing up your micro. This one is produced by Tony Firshman Services and is called the Computer Cleaner. The Cleaner is available in three designs, with one, two or four socket versions costing £14, £18 and £24. We've had one of these in every news column so far, but if you're still looking for one then Firshman can be contacted on 01-267-3887.

Piazza is a stylish italic font. Just right for less-format letters or to give special emphasis to paragraphs. Pitch is 12 cpi to suit narrow paper.

Qualitas

Seven Stars Publishing, who have produced some handy little printing utilities in the past have come up with another one. Qualitas is a program that can be used with Tasword 2 (Tasword 3 version out soon) to print in near letter quality with an ordinary Epson type dot matrix printer. The program comes with five typefaces already included, and you can also define your own using the editor program that comes with it. Very handy if you use the Spectrum for word processing, Qualitas is available by mail order for £7.95 from Seven Stars Publishing, 34 Squirrel Rise, Marlow, Bucks SL7 3PN.

EEC Soft

The Common Market has a lot to answer for! In an attempt to further ruin our balance of trade deficit, top French software house, Infogrames, is about to launch a number of 'high quality' titles onto the UK market. The first of these is a graphic adventure of 'colossal proportions' called Mandragore. Priced at £14.95 the game will come in a twin cassette pack containing 260K worth of program — sounds like it'll keep our adventure troll busy for a while (once they've finished translating it into English).





NEWS

MAD Adventures

The latest game on Mastertronic's £2.99 MAD label is Master of Magic. Described as 'a new kind of adventure' the game uses special artificial intelligence techniques to let you play the role of an unnamed hero plunged into the underworld by Thelric, a master magician.

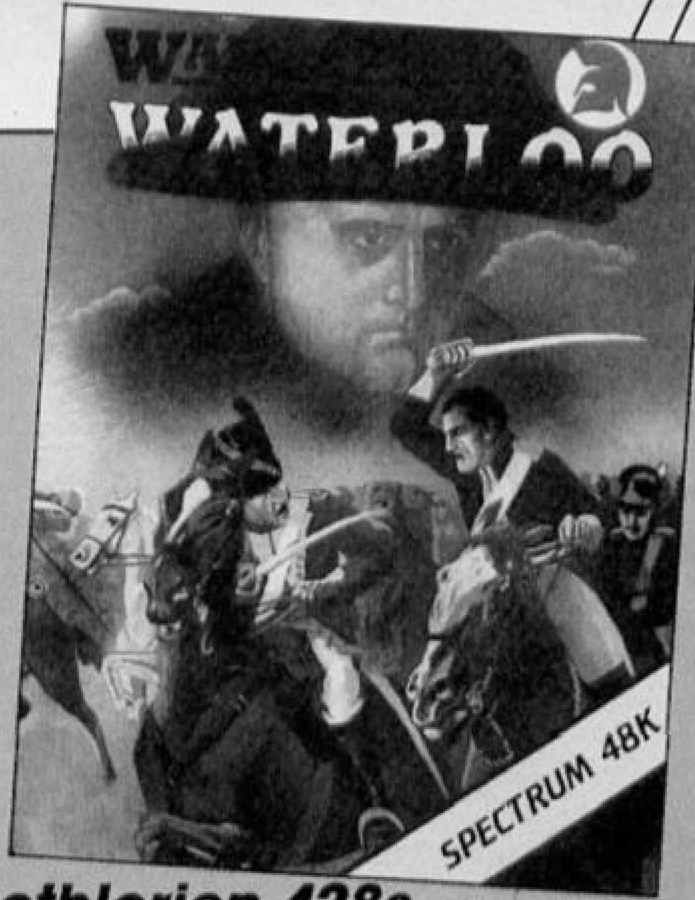
This will be joined by Conquest, an 'ordinary' £1.99 graphic adventure and Molecule Man, written by a new programmer who sent the game in to Mastertronic in the post one day.



Arriba arriba, andele andele!



"Guess who gotta ze software rights to ze 1986 World Cup . . . hold onto your hats itsa coming soon." Lapsing into an extremely silly accent, US Gold are trumpeting the arrival of their World Cup Carnival game which they claim 'will reach new standards in football simulation'. Options will include a choice of kit for all the contestants, penalty mode and different skill levels. The game will also come with a colour poster and team stickers to let you chart the teams' progress through the matches. It all sounds like World War II in shorts, but if you're into football the Spectrum version will cost £9.95 and should be in the shops very soon.



Lothlorien 128s

While most software houses are holding back on 128 games until the machine's future at the hands of Amstrad becomes clear, wargame supremos Lothlorien are converting two of their 48K games for the 128. Waterloo and Austerlitz are now available in 128 version, while Confrontation on the 128 will now include the five additional scenarios which cost an additional £5.95 when bought along with the original version. The 128 version will cost only £9.95.

Operation alignment

Global Software have repackaged their cassette care kit. Formerly called Operation Caretaker, it's now known as Operation Alignment and the new package contains just the alignment testing tape and screwdriver for jiggling your heads with. So if you're having problems with your cassette player and you've got £5.99 going spare, Global can help you part with it if you ring them on 01-228-1360.



Spectrum Games Top Ten

1	Batman	Ocean
2	Green Beret	Ocean
3	Quazertron	Hewson
4	Way of the Tiger	Gremlin Graphics
5	Superbowl	Ocean
6	Starstrike II	Realtime Games
7	Bombjack	Elite
8	Turbo Esprit	Durel
9	World Cup Carnival	US Gold
10	V	Ocean

(Chart supplied by W.H. Smiths)

Batfans will be pleased to see Batman going to this month's number one, and so will Ocean, no doubt. Ocean have currently got four titles in the top ten and only the arrival of Hewson's Quazertron looks like posing a threat to the top of the chart. Perhaps US Gold might have a chance with the release of Pentagram . . .



CRL — again

Just when I thought I'd finished writing about CRL they go and start up a new budget software label called Alpha-Omega. The first Spectrum release on the new label is Captain Slog, a £1.99 arcade adventure set in outer space. This will be followed in a couple of months time by Summer Santa, "a deadly serious game" according to CRL's Paul Woods.

Return of The Ring

Melbourne House have announced that July is going to be 'Tolkien Blockbuster Month'. First they're releasing Lord of The Rings on the Amstrad (yawn), then they're going to re-release that all-time megaclassicblockbuster, The Hobbit. The game will continue to be available in the £14.95 gift pack which includes both game and book, or you can buy a new cassette case with just the game for £9.95. So, if you're one of the few people who hasn't already got a copy of The Hobbit, you've now got no excuse for not rushing out and buying one.





Allies on the march in Tobruk, and a nuclear bomb in Theatre Europe.

Wargames

PSS are marching into action with two new titles in their Wargamers series. Theatre Europe, originally released on the '64, deals with the outbreak of hostilities between NATO and the Warsaw Pact countries, whilst Tobruk is set in World War II. This game allows you to control either Allied or German forces as they battle for control of the vital supply route out of Tobruk which was a crucial part of the Allied campaign in North Africa in 1942. Both games are due out in June at a price of £9.95.



Microdrive 5

We don't know who they are, but the Microdrive 5 have been spotted on the loose in London, somewhere near Brixton. Unfortunately we've had to cut off some of the photo as some of the other bits of graffiti were far too tasteless for a high-class journal like ZX (mind you they were funny!).

Creator

. . . is the name of a new label started up by Argus Press Software. The programs released on this label will all be utility programs of various types. The first releases for the Spectrum will be the Battle Creator and Arcade Creator priced at £12.95.

The Arcade Creator speaks for itself, while the Battle Creator is described by Lothlorien, who are writing the program for Argus, as 'the Quill for wargames'. Lothlorien are also working on Johnny Reb II which will also be marketed by Argus.

Rooopert the Bear

Bug Byte are about to release Rupert and the Ice Palace along with Souls of Darkon (converted from an old Amstrad game). Both games will be at the usual Bug Byte price of £2.95.

High Cs

Hisoft, purveyors of upmarket programming utilities to the masses, have just released an upgraded version of their C Compiler for the Spectrum. The new Hisoft C V1.3 is smaller and faster than the original version allowing you to compile larger programs than before. The new compiler costs £25, and owners of the original version can upgrade for just £5. Anyone interested can get more details from Hisoft on 0582-696421.

QL Competition winners

Back in April we asked QL owners to show off their art knowledge in a contest to win a bundle containing QL Bounder and QL Paint. Our "who painted what" posers presented little problem for QL art buffs who identified the famous daubers correctly almost to a man.

And the winners are M. Scott, Preston; Roma Ives, Ilford; Robin Clarke, Castletown; Alistair May, Elgin; J. Gillick, Strathclyde; Jonathan Ilkins, Stoke on Trent; David Smith, Derby; John Turley, Glasgow; Steve Basford, Letchworth and Brian Oshea of Eastway, London.

For the record Constable painted the Haywain, Da Vinci painted the Mona Lisa, Van Gogh painted Sunflowers and the Laughing Cavalier was painted by Franz Hals.

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48K and 128K



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Use this program for storing all types of information just the way YOU want to store it. You set up a computerised 'card index' system and add records and data to the file in the format that you choose. Advanced features include sorting and searching for specific records, mathematical calculations, printer routines, data summaries, etc. If you don't have a database, you certainly should!

Mailist

This is a specially designed database for storing names and addresses, and printing out in label format. Special search routines are included for selecting only names and addresses that conform to your criteria. The famous Gemini 'Searchkey' facility is included with this program, and data entry is simplified by an on screen label painting system. Just type in those names and addresses as though you were using a typewriter!

Stock Control

One of Gemini's speciality programs, this software will take the drudgery out of keeping stock records. Enter details of part number, description, unit quantity, cost price, selling price, minimum stock level, units in stock, order quantity and supplier details. Detailed reports include totals of stock at cost and sale price, cost of bringing stock up to level specified, gross margin, understocked items, etc. Full browsing facilities to make inventory management a pleasure!

Cash Book

This is a full and comprehensive cash book accounts system designed to REPLACE your manual ledger entirely. It will take you from the 'shoebox' situation of sheaves of invoices, cheque book stubs, petty cash vouchers and bank statements etc. to a properly constituted trial balance. You may then take your FINAL-ACCOUNTS package and produce profit and loss account and balance sheet ready for audit. A REAL money saver when it comes to your accountancy bill!

Final Accounts

Using the data file on microdrive or cassette prepared by the cash book program, this software will produce comprehensive end-of-year reports ready for audit by your professional adviser. The Gemini cash book and final accounts system is now in use by many thousands of businesses and as a 'classic' professional program has been translated for a wide variety of micros. Cash-book and final accounts alone warrant the purchase of this OFFICE MASTER program pack.

Home Accounts

Designed as a complete financial and budgeting package for home affairs, this program allows the user to set up a budget for items of household and family expenditure and compare actual expenditure with budget as often as required. A running total of surpluses and deficits is available both numerically and in bar graph form. A complete bank account routine is included, together with suggested expenditure categories which may be simply altered as required.

Easiledger

Consists of invaluable routines to allow the creation of any type of financial ledger system. Its usefulness lies in its ability to produce account balances instantly for debtors and creditors together with an audit trail of all entered transactions, with dates and references. A year-to-date summary is included of sales, purchases, receipts and payments over a 12 month period, and most importantly, a completely interactive bank account database is featured.

Graph Plot

At last, superb grapns, bar charts and pie charts on your Spectrum! With a complete data entry section and the ability to load and save files, this is really one of the fun programs to use. Represent numbers and data in clear diagrams with this package, and print them out on your printer to accompany reports, budgets, etc. Very highly recommended for the office, home and school. *Also includes capability to provide* mathematical function plotting.

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THE MONSTER RATINGS

Introducing the Globs — a family of dedicated software reviewers who will be working day and night to bring you the lowdown on the latest games. Each month software is airlifted to the family seat, Globule Towers, where it is rigorously tested for entertainment value playability and value for money.



The ZX Monster Hit
The ultimate accolade, a sizzling hit that's essential for your games collection.



Globella
A special game with addictive features. Miss it and miss out.



Globert
An average game with limited appeal.



Glob Minor
Snooze software — strictly for insomniacs.



Glob Senior
An exasperating game well below the accepted standard.



OUTWORLD
Durome Software
£1.99

The ancient game of Kingdoms has been given yet another twist in this variation. Based on the film of the same name insofar as it deals with mining of rocket fuel on the planet 'OUTWORLD', you are faced with "Your toughest job yet."

You have to make as much money as possible in three years, and you begin by choosing the land to mine and your workforce from the Grobblys, Pifflumps and Slurians. By buying machinery and organising loans you can get to work and hope to survive. (I hate games which say 'GOOD LUCK', don't you?)

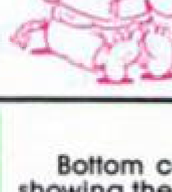
This theme really has been worked to death, the best being the 'MUGSY' variations with many others in line behind them.

The game is competent, little sketch characters liven up the text, but there is nothing to get the adrenalin flowing. The program is written in Basic which is adequate for this kind of game as fast responses are not needed.

It is well presented, text and colour are nicely balanced and sound is almost non-existent (it would probably be a distraction anyway). Screen layouts have been carefully thought out.

I must admit I enjoyed playing this game though. It is easy to grasp the fundamentals, fairly well error-trapped and nicely prompted for inputs. During play it is quite difficult to make a fortune, mining disasters and compensation payouts occur too frequently for the liking of budding Mr. Scargills, but overall the algorithms have been nicely balanced.

Nothing to get excited over, but you could do a lot worse if you want a game of this type. My main criticism is that the options, information and events are a bit limited compared to those provided by the kings of strategy games, CCS. But for a pleasant, simple game this one is recommended, and at least you can win occasionally!



GRIM

HOCUS FOCUS
Quicksilva
£8.95

Take several elements from various games, add a dollop of originality and you end up with Hocus Focus.

You are Jeremy, a punk YOP trainee, given the task of photographing the inventions of a mad professor which are kept, in pieces, hidden around the prof's laboratory in caves under Hyde Park.

Of course it's not that simple. The caves are protected by mutants who appear when you trigger a detector device. These destroy your film and take away your sword (every punk YOP photographer carries a sword!), and you have to go back to the start for another one. The screen is divided into four areas. Top centre is the action screen where, small but finely drawn and animated, Jeremy walks in front of and behind objects.

Bottom centre is the panel showing the number of photos developed for an invention, 20 pics for each and only 16 pics per film, this means at least one trip to the start even if you do not lose your film to a mutant, and there are 16 inventions to photograph.

Actions are controlled by selection of icons in a small window to the right of the main photo panel and a small window left of it shows the pictures ready to be positioned in the main photo panel. All in all there is enough action, challenge and problems for the most demanding arcade-adventure fan.

Playing the game took a little practice, perseverence was rewarded though as the game is worth sticking with. A joystick option is provided and keys are well chosen, though on my keyboard the M key became the comma one for firing.

GAMES

THE SECRET OF LEVITATION

Americana Software
£2.99

I have seen some good programs, some not so good programs hyped as brilliant programs and some that were very dubious value programs. This is one of the latter. I can only describe it as a novelty program and it should be avoided by all arcade, adventure and strategy fans.

The program is actually nine simple little variations on the reaction/observation programs which were all you could cram into a ZX81 in Basic in the good old days. Admittedly they have been tarted up to use the graphics, sound and colour of the Spectrum, but at heart they are all still in this category.

The nine games are pretentiously titled Rapid Reaction, Vibrant Vision, Hand/Eye Harmony, Peak Perception, Mind/Body Mastery, Agile Alertness, Inner Integration, Reliable Recall and Fluent Function. The best thing I can say is that at least the author shares my love of alliteration!



All these 'games' are played against the clock and can be selected individually from the main menu. Scores for each section are kept as you proceed.

So, when do you start to levitate and how? Well I am afraid that YOU don't, but at the end of each section you are shown a crossed legged meditating man who rises to a height dependent on your score for the event. Also from the main menu an option 'L' takes you to a display of the individual scores for each section and a graphic levitation chart shows them for you. Many of the games go on for far too long, especially Mind/Body and Vibrant Vision sections.

Buy this if you want something different, are easily satisfied or want an expensive way of purchasing tape to record on. It may be better to stay down to earth and keep your feet on the ground!



SPIKEY HAROLD

Firebird
£1.99

Spikey Harold, a superbly animated hedgehog, has to prepare for hibernation, and as is usual for hedgehogs, he must fill up by eating as much as he can. In this game there are 57 items, one from each of the cave locations to be negotiated.

Yep, this is another Manic Miner clone and the usual plethora of creatures plus conkers, sulphur clouds, bouncing balls and periscopes float, bounce and zoom around to defeat you by removing one of your lives.

On the positive side there are coins which will give you extra lives if collected (you start with 19 and you'll need them!), and wine glasses which makes Spikey drunk for that screen.

The final problem in Spikey's way is the time limit of 24 hours in which to eat the grub and get back to his home cavern before the frost gets him. The standard is as high as in any game of this type, with large, well animated characters, bright colours with minimal colour clashes, fair sound and challenging screens that are negotiable with perseverence.

Options for using Kempston joystick or the keyboard are provided and because the latter has a redefinable key option, the AGF/PROTEK protocol will also function for joystick control.

Playing the game proved that time and a multitude of variations do not lessen the addictiveness of this style of program. I found it quite difficult to actually get started but once the initial problems were solved then the desire to go further was rather strong. In fact I rather suspect that the only reason this is priced in the budget bracket is because of the unoriginality of the theme.

Worth every penny for newcomers and old hands alike.







My biggest gripe is that the game takes a long while to play and there is no save/load option that I could find. Perhaps not a classic, but a worthwhile addition to any games player's collection.



WORDSEARCH AND CHALLENGE

AZED Software
£?.??

I have long been meaning to type in one of these programs from a magazine listing, but somehow I never got around to it. AZED have saved me the trouble.

There are two programs on this tape as the title implies: Wordsearch is based on the type of puzzle beloved of many and Challenge is based on "Target", a word puzzle published in a well known daily paper.

Wordsearch provides the normal function of a square of jumbled letters in which some words are hidden and you have to find them. There are four options which act as difficulty levels. An extra function, which I personally found useful, allows you to create your own wordsearch from your own list of words.

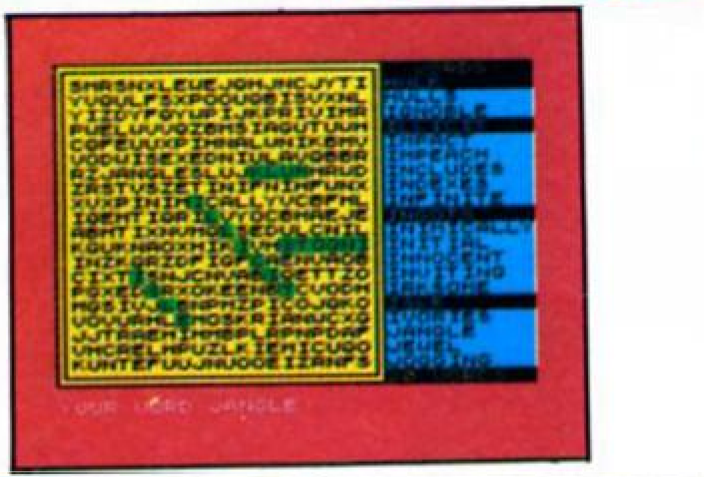
These wordsearches can be printed on either a ZX type printer or an Epsom type via the ZX interface 1 RS232. As the program is in BASIC (no disadvantage) I was able to modify it easily to run on my Centronics system. The only thing missing is an option to enter a wordsearch and word list and let the computer solve it, perhaps AZED would like to work on it!

Challenge is a brain teaser of a program in which you play against a pre-programmed list of words in the computer. This was surprisingly irritating and slightly addictive, although there are a lot of words which the machine does not know (Bunting, Bingo, Newt), which means that you can win without matching those programmed, and not merely draw.

The displays are well thought out and the inputs are easy to use with plenty of clear prompts. A fair bit of error trapping has been included and the only way I could crash it was either very deliberately or by extreme stupidity.

All in all a very reasonable product which is a must for all cerebral linguists.







DELTA WING

Mastertronic
£2.99

Flight simulations tend to be a little boring to arcade addicts. OK, they need 50 fingers and an alert mind and may be realistic but just flying around aimlessly seems a bit pointless.

Delta Wing attempts to overcome this by adding a combat element to the action, you have to bomb the enemy bases the number of which, one to six, you select at the start. Air to air combat is also featured and the enemy planes are out to destroy both you and your bases.

Flying seems a little easier than on some programs, but it certainly isn't simple. The control panel at the bottom of the screen contains 14 indicators and guages and there are 14 control keys to master. Graphically the game is excellent, the cockpit panel is crammed full but is still readable, they even found room to show your hand on the joystick, moving up/down/left/right as you press the keys. Even the pilot's knees move!

The usual two screen modes, an actual view and an aerial map are included and I suspect that the lack of ground detail in view mode is the price paid for the combat routines.

Speed is always a factor in this kind of program, and here the program scores, scenery (mostly horizon) is acceptably smooth and enemy planes (wire frame) move very quickly — blink and you'll miss them apart from the bullet holes which appear in your window.

All joystick protocols are supported and there is even a two player option for two Interface 1 owners connected by the net.

Simulation purists may not like the combat routines and arcade addicts may not like the amount of simulation, but I loved it!



TWISTER

System 3
£7.50

1985's PCW show wasn't terribly memorable, except for one thing; the goings on at the System 3 stand. To promote their 'soon to be launched' game Twister, they had a band of semi-naked girls running around their stand with whips!

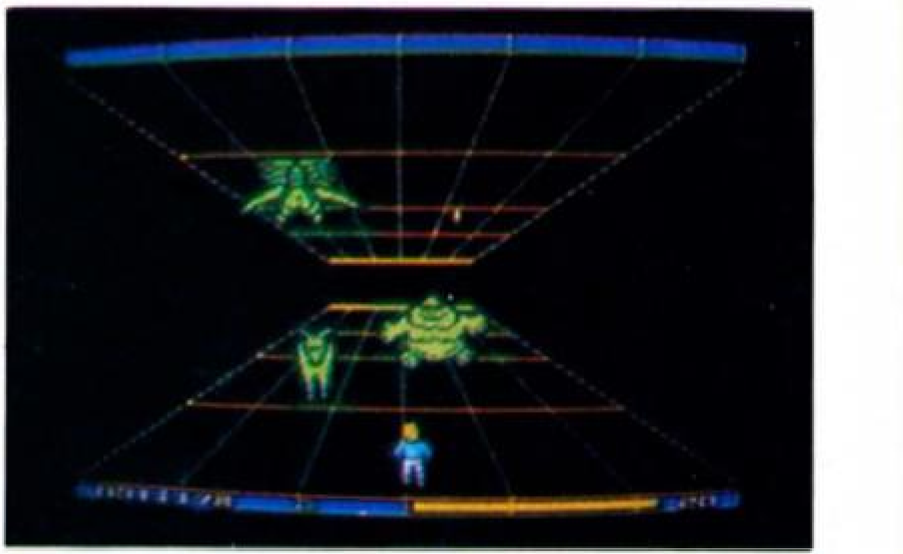
It actually took until the middle of March for the game to be finished, nearly six months! Was it worth the wait? In some ways, yes, and in others, no. Sub-titled Mother of Charlotte, Twister is, to quote the inlay, "the blackest hearted dweller in Hades", and it is up to you to save the world from a fearful doom by killing her.

To play Twister requires either some deft finger movements, or a joystick interface, preferably the latter. The object of the game is to complete various 'dimensions', by killing a certain amount of devils, and collecting the correct symbols — which are dotted around along the way. Each completed Dimension gives you a section of the psychic bolt. In order to kill the Twister, you must have all the sections of said bolt.

Graphically, Twister is excellent. All of the levels have been carefully designed and drawn, and the feel of travelling into the screen has been achieved with dramatic effect.

Each Dimension provides different hazards, though they all share a similar objective. You must collect various symbols, and when you have collected the right amount, the next screen scrolls on very neatly. How long your game lasts depends on your ability to jump or move around, shoot hundreds of Demons, and watch out for which symbols you need to collect. On the first screen the symbols are the various suits of cards — spades, hearts, diamonds, clubs — on the second screen you must collect the seven letters that spell Twister, and so on. I can say that I played for quite a while before managing to get much past the third screen!

As Spectrum games go, the sound was very good, and it showed that a little imagination can go a long way. Twister is a very original game, and it is apparent that a lot of thought has gone into the game. It has a few details that remind me of the original Tempest arcade machine, but they are used in such a diverse manner that this isn't very apparent.



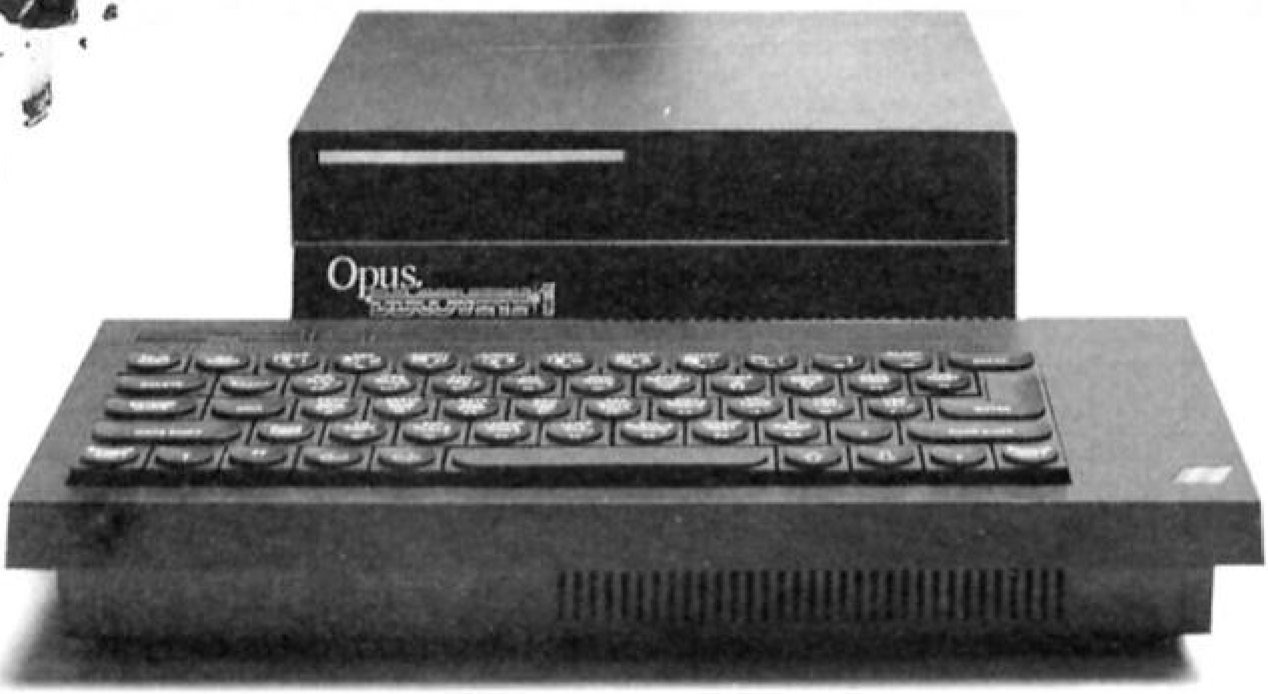
Priced at £7.50, Twister actually represents relatively good value for money, especially in comparison to many games retailing at £10. Twister is a game that will appeal to a wide variety of Spectrum gamers, from the diehard shoot-'em-up fan to an arcade/adventurer with an itchy trigger finger! Recommended.



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Opus.

READ ONLY

Comms, Abacus and the Turing Man are on this month's book menu.

The future features strongly this month, both the years far ahead with the way that the computer and man are going to integrate and the immediate future with the process of computer communications, which is heavily used at present, but is also definitely a land mark in the time to come.

The first book is called **Turing's Man** and before we actually begin to examine the book, I shall first briefly introduce to you Turing, who he was and his concept of the Turing machine.

Alan Mathison Turing was an English mathematician, born in 1912 and died at the age of 42. The paper which made him famous posed the question "how far the exercise of logic resembles a mechanical process". This provided computer scientists with what has become the concept of a Turing machine. The definition of a Turing machine is, wait for it, "a hypothetical universal computing machine able to modify its original instructions by reading, erasing or writing a new symbol on a moving tape of fixed length that acts as its program".

The above quotes may give you an idea of the sort of book this is. The book itself gives a great insight into the link between history and the computer technology of our day (and perhaps the future) and provides a bridge between the gap.

A quote on the back cover from Beryl Bainbridge says that "the subject affects every one of us", and indeed it does. The question however is that, without seeming to be a Philistine, do we really need to know?

Turing Man

The book goes into great detail of how the Turing Man should be made up, in fact the author's general idea of the man that Turing envisaged. But my own idea formed from the book is that Turing's Man is really not too interested in the history of man, although this lack of interest should be impressed upon him. Perhaps I myself have gone too far down the path of Turing's man to be interested in the history of the advancing age of the computer.

We are all in some respects Turing's men, and the book clearly defines if you are one or are not. Turing's man very simply is someone who agrees with the view that the computer is giving us a new definition of man, as an "information processor" and of nature as "information to be processed". A Turing man is also one who thinks like a computer. One who in every day life thinks in the way a computer thinks.

The book is too vast even to present a precis of the text here and even then I am sure that I would not do the book justice. The text goes far back into ancient classical times, right up to the current century, and further, and shows the reader the way the Greeks devised the computer and the effect that this had upon our lives. Stepping forward in time, the clock is taken as the key machine of the modern industrial age. Time keeping is a subject which the author proposes ended up controlling men, so is the computer as we know it going to end up controlling man? After reading the book, I thought yes, although I am not too sure if the author shares my opinion.

This argument, and I do feel that I would lose it if faced with Doctor Bolter himself, is one of many which the book creates. It is very difficult though to establish who the book is aimed

Counting On QL Abacus
J. W. Penfold
Bernard Babani Books
£2.50

The books published by this company are many and varied, all small in size and low on price, and Mr. Penfold is their pet QL writer having also produced Into the QL Archive, An Introduction to Programming the Sinclair QL and An Introduction to QL Machine Code. Plus sundry other works of note.

So the author knows his stuff, but how does he communicate it in his book? Well first of all it is worth looking at who he has written it for, and a good indication for things to come is that he tells us without any delay in his preface.

"This book is designed to introduce the complete beginner to the use of spreadsheets in general and Abacus on the QL in particular."

Well, I may not be an expert, but neither can I be classed as a complete beginner, so after reading the book I let a friend who qualifies as a complete beginner read it.

From my point of view it was very easy to read, demonstrations and examples were well chosen and helped to clarify the text. Added to this, the straightfoward, factual approach did not make me feel that the author was talking down to me.

The book consists of seven chapters and a two page appendix which covers the version two amendments. The chapters are pretty clear from their headings: What is a Spreadsheet?, First Practical Example, Mathematics Cut Down To Size, Accounting Examples, Technical Examples, Using Printers and Import and Export. The last being a brief explanation of how to use data with the other Psion programs.

There are a couple of interesting practical examples, eg. a credit card calculator and a monthly cash account, and each is developed in a step by step fashion with detailed explanation all the way.

So how did my friend get on? Well, he came back and proudly showed me his masterpiece created on Abacus, he had found no problems getting to grips with the book and was quite enthusiastic. Up till now he hadn't bothered with Abacus because he didn't see any point to it in relation to his own needs. Now he claimed he had a few ideas on how he could make use of the program and his first effort, which he was stuffing under my nose for approval, was a printout of his school timetable (he is a teacher). Perhaps not the use envisaged by either the program authors or Mr. Penfold, but perfectly valid.

If you have difficulty getting to grips with the QL Abacus manual then this is a superb introduction, though if you have already mastered the basics of Abacus then the book may not provide anything new.

at. Will the prospective reader be more interested in the Artificial Intelligence side of the Turing idea rather than the philosophical background? The book is ideally aimed at the man in the middle, much like the author himself, who is a man of history as well as a man of computers.

Due to its content, the book will not be suitable for the computer enthusiast whose main aim is to play computer games, but for anyone who is bored with the usual mundane front end of the computer and requires to go further into the computer, then this book provides the reader with enough detail to leave him thinking about the technical age of computing, from the past right through to the future.

Comms

The next book is yet another on computer communications. It used to be fashionable to produce a book on computer games, perhaps now it is just as fashionable to bring out a book on computer communications. The somewhat lengthy title of the book, **An Introduction To Computer Communications,** may conjure up images of a paperback book as big as the size of a concise dictionary, jammed full of technical information. Well, think again. The book has only 72 pages, and priced at £2.95 is a bit of a let down. Even with the 72 pages, the author has managed to slip in approximately 14 pages of diagrams, of which about only half are necessary.

As is the fashion with all these communication books, the initial pages introduce the RS232 and the serial line. Modems are described in general, trying to suggest the best modem to purchase for your computer depending on your requirements. I think that it would be much more useful if the author had perhaps suggested a few modems that the readers may buy depending on their computer rather than yet another diagram of the RS232 port connection.

The author states that it can be very useful for the modem to have an auto dial facility so that a great deal of time is not lost repeatedly dialling the host computer telephone number. The author says that it 'seems to take half a dozen or so attempts before most systems can be accessed'. Did he know that it is BT regulations for a number to be re-tried up to a maximum of five times only?

After the modem chapter (there are, incidentally, only three chapters in the book), there is a chapter on local networks. This provides options on creating Home-Spun networks, whereby computers can talk to each other. I felt that not enough time was taken on this chapter as this is most definitely something many readers would like to learn more about. The Spectrum, alas, only features for a small amount of time.

The book does provide some handy technical information on connecting computers via the serial interface or parallel interface, and I would suggest that this is the book's strongest point.

Due to the range of the subject, it would have been far better if the book concentrated on one aspect rather than jumping between networking, radio communications and modems. There is much to learn about these, and there is no doubt that the author does know his stuff, but the book does not do justice either to the author or his chosen topics.

TURING'S MAN is written by Dr. Jay David Boulter and published by Pelican Books at £3.95.

An Introduction To Computer Communications is written by R. A. Penfold and published by Bernard Babani at £2.95.



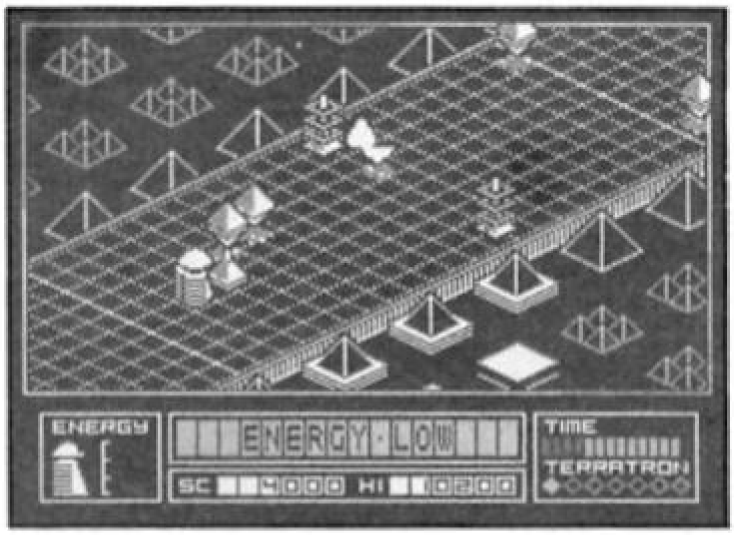
Vortex are back on the road again with a robotic jaywalk into alien territory

Alien Highway
Vortex Software
£7.95

Alien Highway is Vortex's follow up to their earlier hit, Highway Encounter and continues the saga of Earth versus the Aliens with you as the hero of the hour in control of the Vorton robot.

In Highway Encounter the Aliens were attacking Earth, but this time around their attack has been thwarted and the Vorton is retaliating by preparing to strike deep into the Alien's own empire where a final attack on their Industrial Complex should put paid to their hash once and for all.

As is the way with sequels this one looks remarkably similar to the original. The highway along which you have to travel with the Vorton looks just like the one in the earlier game, and the types of obstacles and aliens that you'll have to deal with are also much the same. For those who are unfamiliar with Highway Encounter, the Vorton is a small Dalek-like robot which glides along the highway pushing the Terratron along in front of it. The Terratron is a little pyramid shaped object which is your





secret weapon and which will burst into action when you reach your final destination. The hard part is getting the Terratron all the way along the highway.

Controlling the Vorton is relatively simple, just accelerate/decelerate, rotate left/right and fire (though I wasn't all that keen on the choice of keyboard controls which aren't redefinable). As long as you're in line with the Terratron it will trundle along in front of you, but as soon as you start to dodge around in order to avoid the aliens and other obstacles you're almost certain to lose control of it which means that having successful navigated down a dangerous stretch of highway, the chances are that you'll just have to go back to pick up the Terratron again.

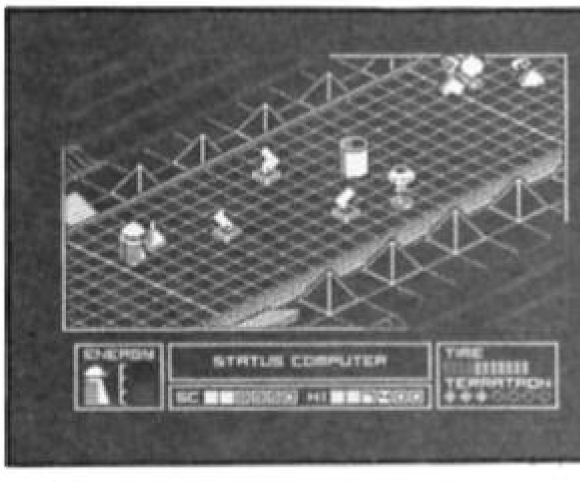
The graphics are drawn in a quite distinctive style that lends the game much of its flavour. If you can imagine a futuristic and rather less cute version of Knight Lore then that's what this looks like.

As with Knight Lore, you've got a slightly overhead, 3-D perspective view of the highway, but instead of enclosed rooms you're given a short stretch of the highway which travels from the bottom left to top right of the sccreen. On each side of the highway is a force field which drains the Vorton's energy whenever you collide with it, as does contact with the aliens.

Trying to control the Vorton (which has a habit of going wildly out of control if you're not careful), and keep the Terratron in tow at the same time as dodging the obstacles and zapping the aliens will keep you pinned to your keyboard or joystick for quite a while. This is the sort of game that starts off slowly enough but then gets hectic as everything starts to gang up on you.

One feature that I wasn't too keen on is that you only have the one life to play with. The Vorton has a limited amount of energy and when this is drained the game ends. It is possible to recharge at points along the highway, as there are energization stations at which you build up the Terratron's own energy levels, but if you get caught in a sticky corner of the highway all your energy can be drained in one or two seconds.

This means that you can get a long way into the game only to see all your effort wasted by one wrong move, so I think a couple of extra lives would have helped improve the game's addictiveness. Other than that, the only criticism of the game that I can think of is that it is so similar to its predecessor. If you've got Highway Encounter then you might be reluctant to shell out more money for a game that is so similar, but if you haven't played the earlier game then Alien Highway is a classy and challenging shoot 'em up.



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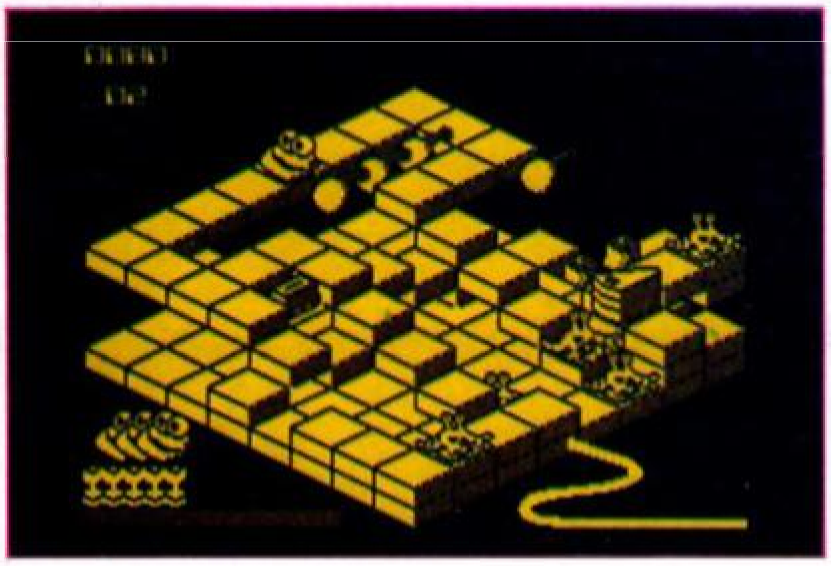
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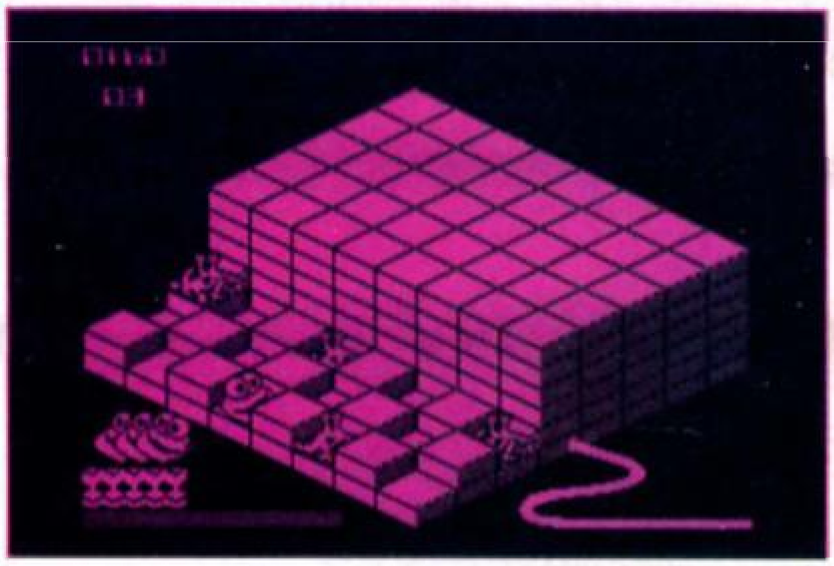
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KIREL

Addictive games may seem to have been lying doggo since their heyday and the success of Football Manager, but they're back and living up to their name with their latest release, Kirel.

Kirel Addictive Games £7.95





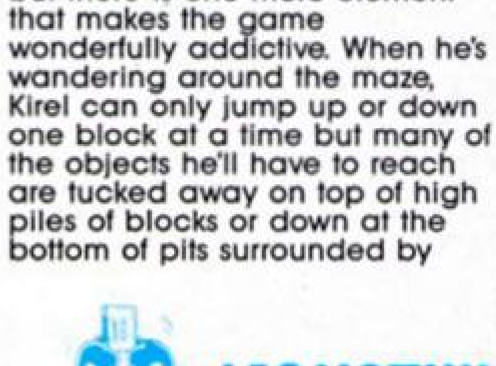
This isn't an easy game to describe — to say that it combines elements of Knight Lore and Pacman makes it sound derivative and doesn't really do it justice. Kirel is the name of a blob-like character with bulgy eyes and a silly grin, who finds himself on a board upon which layers of blocks are arranged in complex three dimensional maze structures.

The board is eight blocks wide by eight deep and the blocks can be piled up in layers half a dozen high. This means that there's enormous scope for creating structures with the blocks and the game contains a total of 70 screens.

In addition to the obstacles created by these blocks each screen contains a number of objects that have to be collected within a time limit in order to move on to the next screen. If you don't finish the screens in time there is a lit fuse under the board that burns down and blows the whole thing up. Also slithering about the boards are strange jelly-like creatures that can drain Kirel's energy level if he comes into contact with them.

To complete each screen you have to guide Kirel to the lit bombs hidden in various corners of the maze. These are sometimes hidden beneath layers of blocks which means that even with the 'reveal' function that pauses the game and give you an x-ray view of the maze you've still got to puzzle pretty hard over how to reach the bombs. Also positioned within the maze are transporter pads, arrows which, when collected, allow Kirel to build bridges across sections of the maze, cake and sweets which boost his energy and allow him to kill the jelly monsters.

So far it might not sound like anything particularly exciting but there is one more element that makes the game wonderfully addictive. When he's wandering around the maze, Kirel can only jump up or down one block at a time but many of the objects he'll have to reach are tucked away on top of high piles of blocks or down at the bottom of pits surrounded by



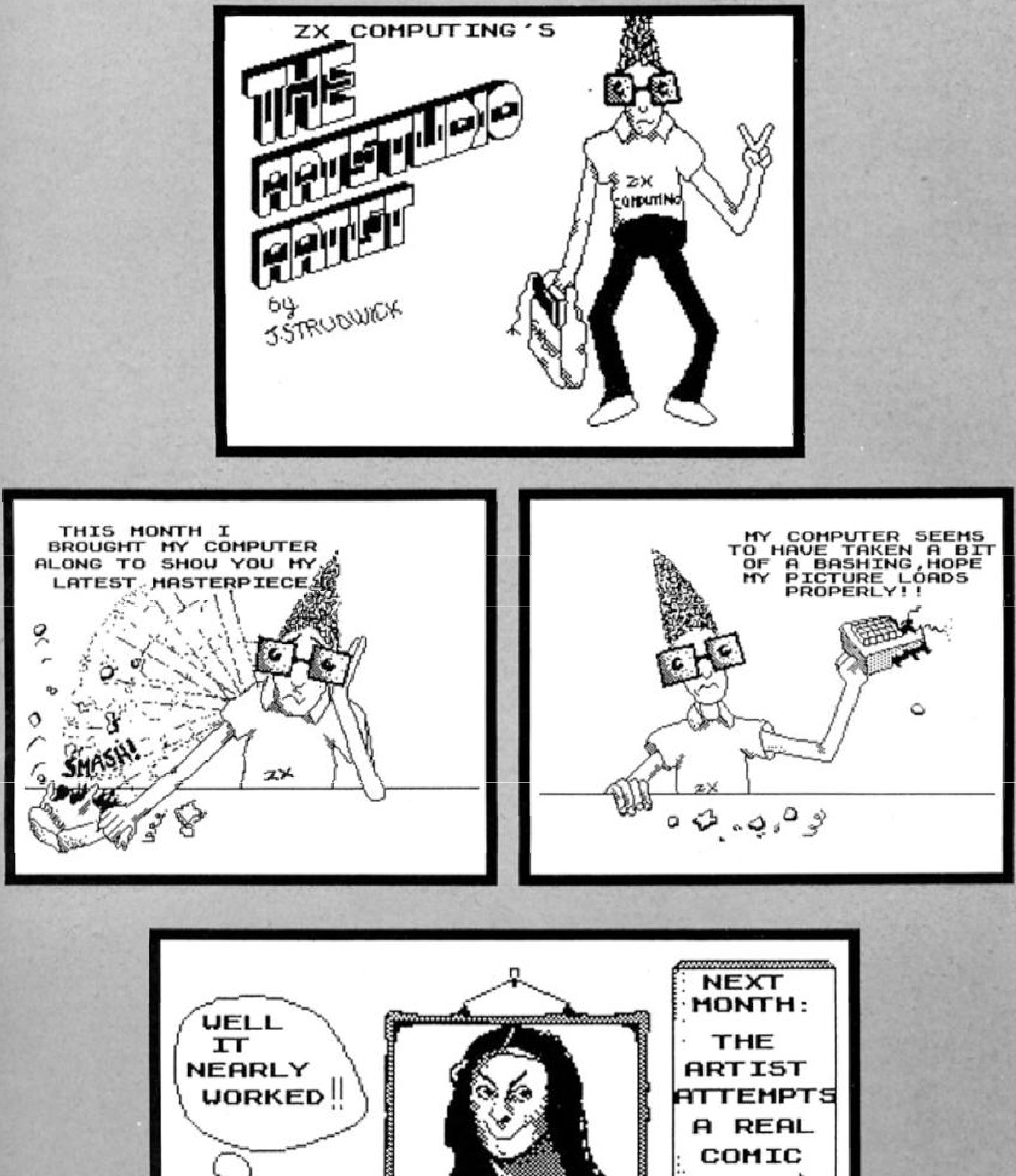
blocks which makes them inaccessible. So, in order to be able to get to all these objects Kirel can pick up and drop one block at a time and build his own stairways and ledges and, in effect, rebuild the maze to suit himself. This leads to some frantic scenes as you rush around the screen moving blocks and trying to get to the bombs before the time limit runs out.

This is one of those games where you can almost see what you need to do but can't quite get it done in time, so you keep on trying to beat the speed limit or to change your tactics in an attempt to get onto the next screen. The time limit and the monsters add an element of arcade action to the game, but this is nicely balanced by the strategy and quick thinking needed to plan ahead and rebuild the maze structure as you go along.

In a game like this the quality of the graphics and animation are less important than in most arcade games, but Kirel is nonetheless well designed and animated. All the graphics are large and clearly drawn despite the amoung of stuff that is cluttering up the screen. And there are some nice touches, such as the ability to alter the viewpoint so that you can see in and around the maze, which show that the programmers have paid a lot of attention to detail.

I don't have any real criticisms of Kirel, though I do think it would have been nice to see user-definable keyboard controls, and some of the purple screens are a bit rough on the eyeballs. The time limit on the screens is a bit short too, though there is a practice mode in which you can have all the time you want.

I have to admit that I wasn't expecting Kirel to be anything special when I first loaded it up — after all, it does use elements from some quite old games and there's nothing particularly 'state-of-the-art' about the game — but it really does manage to mix all these old ingredients and come up with a brand new recipe that's highly addictive and deserves to rival the success of Football Manager.


ZX COMPUTING'S
by J.STRUDWICK
ZX COMPUTING
THIS MONTH I BROUGHT MY COMPUTER ALONG TO SHOW YOU MY LATEST MASTERPIECE
SMASH!
MY COMPUTER SEEMS TO HAVE TAKEN A BIT OF A BASHING, HOPE MY PICTURE LOADS PROPERLY!!
WELL IT NEARLY WORKED!!
NEXT MONTH: THE ARTIST ATTEMPTS A REAL COMIC HERO!
2X COMPUTING

A new musical keyboard exploits the potential of the 128's enhanced sound capabilities. Toni Baker tinkles the ivories.

This is a system comprising a musical piano-style keyboard and software to go with it, and an optional amplifier/speaker. The keyboard measures about 56cm across and has 37 keys covering three octaves. The feel of the keys is very good, and they react well to the touch.

To operate the system is very easy. The keyboard connects to the Spectrum via a ribbon cable which plugs into an interface, which in turn plugs into the edge connector at the back of the Spectrum. You must have a Spectrum 128. The system won't work on a 48K machine. Then you just plug the Spectrum in, select "128 BASIC" from the main menu, and LOAD the software. The version I was supplied with was on cassette, but I had no trouble whatsoever in adapting the program to a microdrive version, since all of the LOAD and SAVE commands were in BASIC — just change LOAD to LOAD * "M";1; in line 100, and SAVE to auto-run from line 10.

The software I was supplied with gave a menu on screen allowing a choice of eight different instruments. They were Piano, Strings, Organ, Popcorn, Evolution, Siren, Synth and Hawaiian. The blurb in the HCCS manual says that sixteen voices are available for a disc drive version (and if so I don't see why those same sixteen voices should not be available for a microdrive version, but perhaps they will be). The sound is reproduced through the television speaker, and also through the (optional) Echosound Speaker/Amplifier. The best sound is obtained by turning the TV sound right down and just using the amp, which is connected to the Spectrum via the MIC socket normally used for saving programs to cassette. The sound quality thus produced is excellent, and I must say that even without the amp the sound produced from the TV speaker isn't bad either.

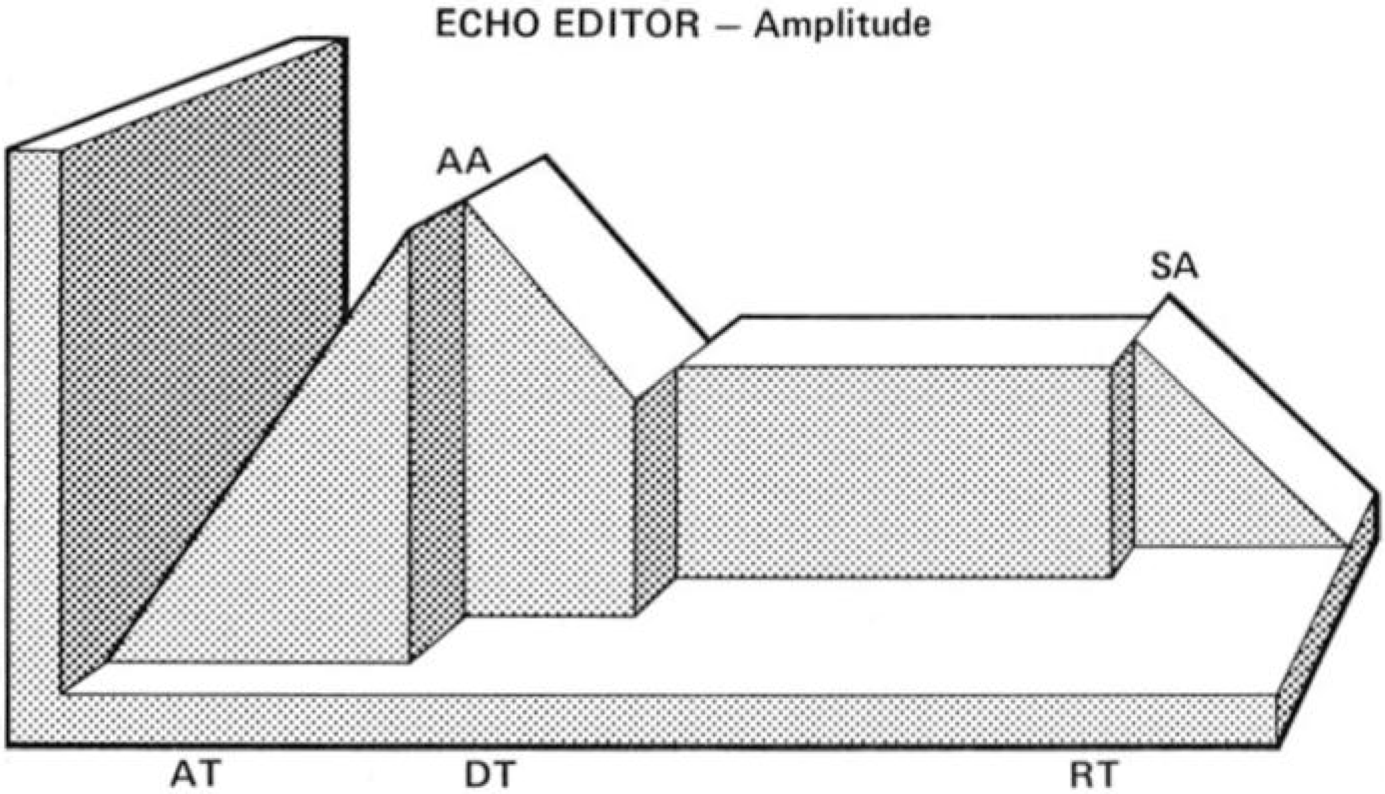
The system makes use of the Spectrum's in-built sound chip, and is thus capable of playing up to three notes at once, which means that chords may be played. If more than three keys are pressed then only the three higher of the notes will be played — a system which seems to work very well.

As for the sounds themselves — well some are good and some are bad. The piano sound is good, but the keys are not pressure sensitive, which means



Echo Keyboard (For the 128) HCCS £49.95

SOUND OUT THE ECHO



Attack Amplitude	(AA)	010
Sustain Amplitude	(SA)	000
Attack Time	(AT)	001
Decay Time	(DT)	031
Release Time	(RT)	005

that if you hit a note vigorously it sounds exactly the same as pressing the note gently. This means that you can't really use it *as* a piano. The strings sound is in fact a violin sound, although you can easily alter it (as you can all of the sounds). The organ sound is exceptionally good. Popcorn is a short blippy sound like that on the single of the same name which hit the charts a few years back. Evolution is one of those weird sounds which starts off silent and then slowly builds up, which makes it ideal for playing slow spacey music on. Siren is even weirder — if you hold one key down and keep it pressed it sounds rather like a police siren (one of those American ones), but the music you can get out of it is quite unbelievable. The synth sound is very nice; it's both beautiful and melodic. Finally we have the Hawaiian guitar sound, which is equally as nice.

All of the sounds are adaptable. Select the sound you wish to adapt and press the space bar. You will then be greeted with a screen like that of figure one. Now the up and down keys may be used to select the aspect you wish to change, while the left and right keys will change the actual values. I found that selecting values 10/10/4/4/4 from the "piano" sound actually turn it into quite a nice flute sound. When you've designed your sound you press the space bar once more, which returns you to the main menu. You can now rename the instrument on the menu by just pressing the alphabetic keys (eg FLUTE) followed by **"enter"**, but note that only capital letters will be accepted. If the program was loaded with **"caps lock"** on then all letters will come out as capitals, otherwise the letters will be ignored unless **"caps shift"** is used. You can now play your new instrument.

HARDWARE

Instead of having to recreate new sounds every time you switch the thing on, you can load and save sounds very easily. Pressing the semi-colon key produces the message "SAVE filename" at the bottom of the screen. You can escape from this by entering the empty string, otherwise you must input a filename. All of your sounds will be saved with this filename. Similarly, by pressing the quotes key you get "LOAD filename" and are able to retrieve previously saved sounds. The software supplied loads and saves to and from cassette, however by changing lines 220 and 320 I was able to instead use the microdrive. This eliminates the problem of having to line the cassette up before loading in data, and is much faster.

The main display also allows you to change octave by pressing the left and right keys. You can go from −2 to +2 in steps of one octave. You can also change the pitch by pressing the up and down keys. Here you can go from −96 to +96 and each step represents a quarter of a semi-tone. By playing with these controls whilst playing a note you can get some good warble effects.
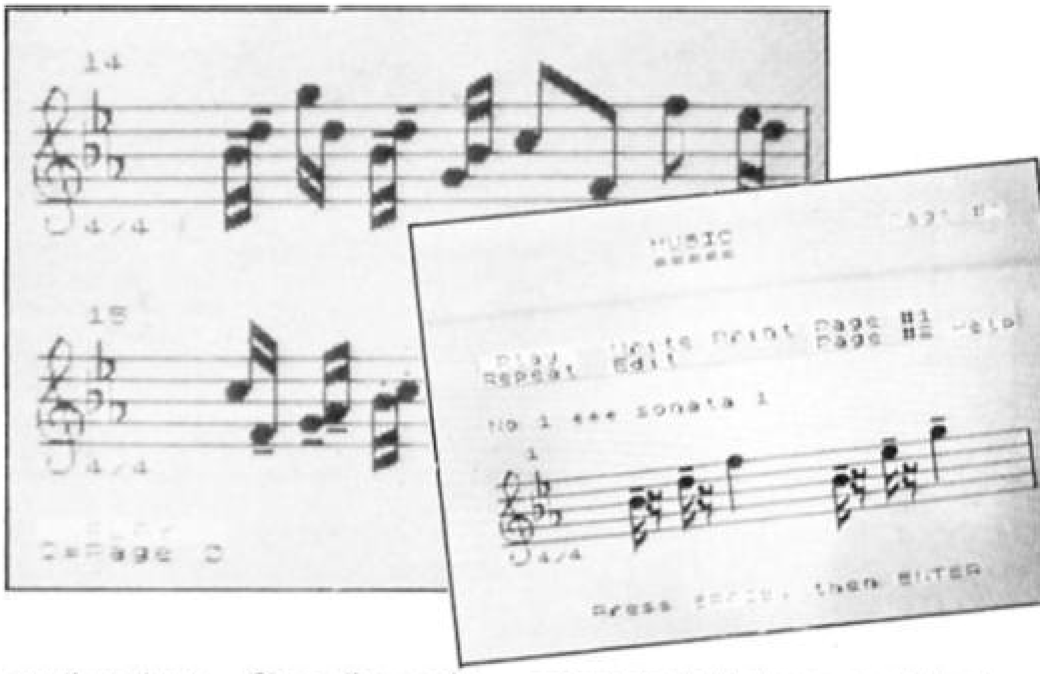
HCCS say there should be more software for the keyboard in future. We are promised a record and playback facility, and a repeat facility which could provide a backing track. I haven't seen these options, but then my package came without an instruction book, so maybe I've just missed them.

The keyboard and software is incredibly cheap for what it is at fifty quid (£49.95). The Speaker/Amplifier is forty quid (£39.95) but if you've got one of these hi-fi stereo tellys you probably won't need it. Actually it's possible to take the sound from the Spectrum's MIC socket into any hi-fi amplifier, so if you've already got one you don't need HCCS's. In any case the amp is good, although I would question its value for money, since it puts up the cost of the keyboard system by nearly 80%. The keyboard, though, is certainly well worth buying and is exceptional value for money.

SOUNDCHECK

ZX waxes musical with a survey of software packages for the Spectrum
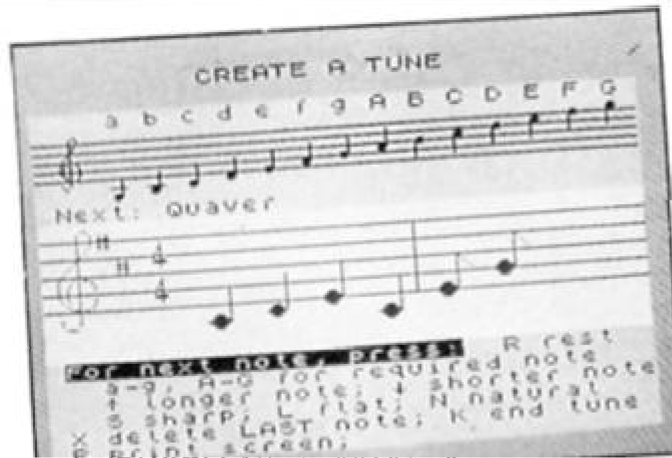
Music Typewriter
Romantic Robot
£7.95
(With Supplement £9.95)



This is my all time favourite music program for the ordinary Spectrum. It is probably the most complex to use yet has the easiest system of note entry that I have seen. This company were using Icons before icons were the "in" system! A keyboard overlay for the rubber key Spectrum overlay and user manual, eight, small print pages of concise and well written intructions are included. Constant access to three program pages, each with their own help options, is provided while the program is operating. All the control options and variations on tempo and key signatures are included plus notes which range over six octaves.

On screen graphics are superb! Of course the end result is still monophonic and lacks expression giving tunes the bland Spectrum music sound. However it was to Romantic Robot that Micro Musical came when they wanted software written for their Midi Keyboard and interface — but that's another story. . . Since the early version, which I had, they have produced an even more sophisticated program with the supplement program. This provides a superb printout via a dot matrix machine through a variety of interfaces. Most Epson style printers operate well, except my CP80! which loses a couple of notes at the end. A conversion program for M/drive is also provided. My biggest moan about this, and many similar programs is that you could not use the end product in your own programs and games. The extra supplement provides a program to take files created by the typewriter program and convert them to stand alone machine code music. (i.e. tunes play without the main program to play them).

After over a year this is still the best program around in my opinion. I can't wait to see what they produce for the 128.



Musicmaster
Sinclair
£9.95

Written by Incognito Software this is a good all round package. I have been using it on and off for the last year or so and it did not take long to master.

At first I found the accompanying booklet, all four and a half pages, leaves a lot to be desired in the field of clarity. You are also assumed to know at least the rudiments of musical notation.

There are two modes of operation, keyboard or stave and these dictate the method of note entry.

The keyboard provides notes from middle C up ten tones to E and a keyboard overlay is provided, which is only of any real use on an early rubber key model Spectrum. Notes are played by pressing computer keys which represent a piano keyboard. In stave mode notes are entered by pressing a-g and A-G giving two octaves playing range.

One aspect which takes a little getting used to is that any incidental sharps and flats, and indeed the note lengths themselves must be selected before the note pitch is entered. However a 'delete last note' option is supplied.

The program is filled with prompts and I found it reasonably easy to get to grips with it, but the note lengths are displayed by their names and it is confusing unless you are familiar with such terminology.

Save, load and, of course, play options are included. Most important is the Amend option and this makes life less stressful if creating your own masterpieces.

The Spectrum cannot put any expression into its music and all songs tend to sound a little monotonous, however playback is fast enough and smooth enough to be satisfying to listen to.

In itself this is a great program for those who have a little experience and want a program to experiment and play with. A pity that there is no option to save songs and include them in your own programs/games.

Wham! (The Music Box) Melbourne House £7.95

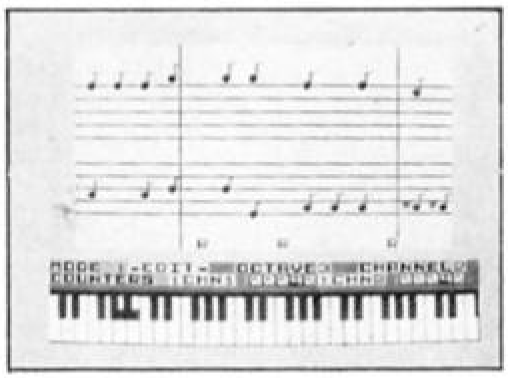
The program stands up on its own without the Wham! tie up and I have heard music produced on this used in several games, mostly MH's.

The most striking thing about this program is that by clever programming your ears are fooled into hearing two channel sound. Several songs by the duo have been included as demos and pretty impressive they sound.

Of course now the 128 is here the program is a bit outdated due to the AY sound chip now being used (see next review).

Once you've loaded the program a menu appears giving options to Load tune, Save tune, Hear tune, Whampiler, Set tempo, Edit or Help. The instruction insert is a strange mixture of brevity and step by step details. Bits of it were slightly confusing.

Drum effects can be used, but these use both channels so a



musical note cannot be played at the same time. This means a fair bit of ingenuity is needed to use the percussion effectively.

The "Whampiler" is a great boon, turning a novelty program into a useful utility. This allows you to save your tune in a form which you can use in your own games.

Note entry is a bit awkward, and needs getting used to. This is not really a program for the musical novice, although such a person could use it successfully, but more a utility for musical computerists or games writers who want the best sounds available in their program.

It is quirky to use, editing is easy though, and this is an important factor, with patience and time you can produce the best music/effects possible on the 48K Spectrum.

I enjoy using it, though dedicated musicians may find its limitations and unusual features off putting. For instance all the notes are entered as semi quavers and longer notes are made up of repeating as many as are required. This means fast single note trills are nearly impossible to do.

Although even a little expression is feasible using the percussion, the end result is still rather robotic.

Screen display is varied, at times clear and simple and at times rather cluttered. The user is well prompted but sometimes careful scrutiny of the screen is needed to find the info you want.

All in a very useful and interesting program, especially if you have an external amp/beep booster attached.

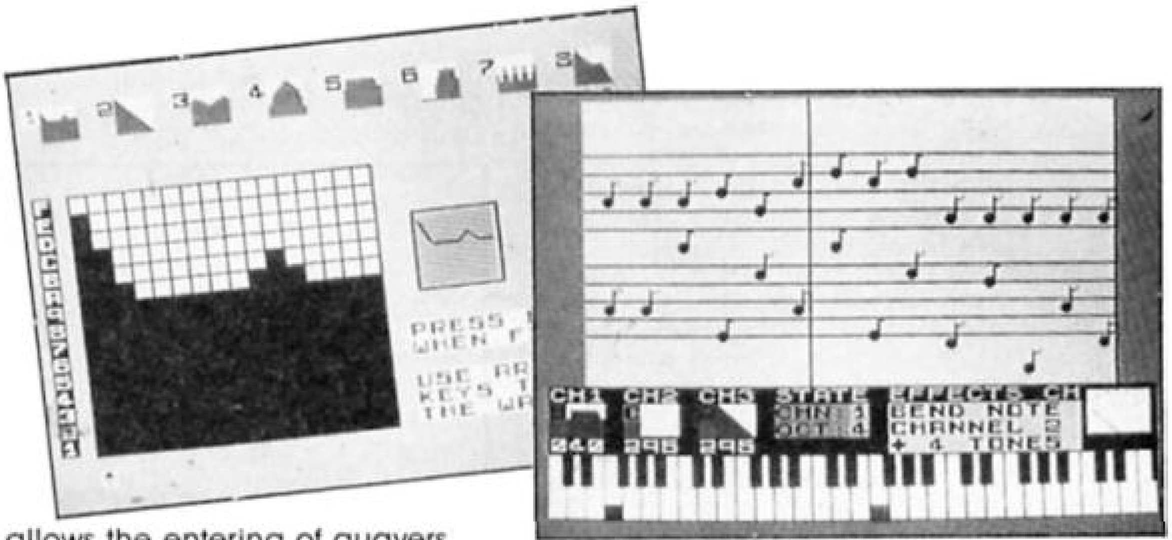
The Music Box (48/128K) Melbourne House £9.95

The Music Box from Melbourne House brings advanced music programming within the reach of anyone with a Spectrum 48K or 128K, even if they have very little knowledge of music. Apart from being a flexible music creator, it is also a programming aid because any composition can be compiled and saved for later use in your own programs.

There are two versions of the program on the cassette. The second version allows access to the special facilities of the 128 such as envelope shaping and RAM disk access.

The 48K version allows access to two voices, each spanning four octaves. The lower two rows of the keyboard are defined as a single octave musical keyboard for entering the notes. With a range of four semitones over the octave, the span is so wide that you can write some tunes without ever having to change your octave setting. The upper keys allow access to the special functions and voice or octave selection.

Selecting the Edit function from the menu screen reveals the main music making screen. A piano keyboard is depicted at the bottom of the picture under the array of windows which display the current status of the chosen voice. Above this is an extended musical stave on which the notes appear as they are played. The stave scrolls from right to left as each note is entered. The program only



allows the entering of quavers but this is merely an arbitrary concession to traditional musical notation. If longer notes are required it is possible to repeat a series of quavers set to the same pitch which will then be played as a continuous note. Shorter notes can be set by altering the tempo of the tune and extending the length of longer notes accordingly.

One of three percussion effects can be selected from the three set effects or these can be reshaped to suit your own requirements. These sounds use both voices so notes and percussion cannot be sounded at the same time.

The 128 version is much more versatile. Envelopes can be reshaped several times during a tune, notes can be bent and there is access to three voices. One of the voices may be reserved for the wider range of nine redefinable percussion sounds, but notes can still be added here and there if the composition demands it.

Although all compositions are depicted in the key of C major, this does not limit the range of tunes which can be played. The inclusion of semitones (the black keys) on the keyboard means that this restriction only limits the way in which the tunes are displayed on the stave.

The Music Box has been designed to be as user friendly as possible and it certainly achieves its aims. The main problem for the musical novice will be deciding the relative length of each note but this skill will come with practice. The main advantage of this program is the compiler which allows the tune to be played constantly over a menu screen or note by note if you want to integrate it with an action screen.

This program should appeal to both the budding Beethovens out there or the games writer who wants to add the extra ingredient of music to give the final polish to their gleaming creation.

Carol Brooksbank looks at the latest to Ocean's IQ range of utilities

Laser Genius (48/128K) Ocean IQ £14.95

This addition to Ocean's IQ series is an Editor/Assembler and Monitor/Analyser. Despite the slightly alarming handbook, (a quarter-inch thick) the program is very easy to use — flexible and user-friendly. Wherever possible the user is given choices. For instance, the assembler accepts decimal, hex, binary or octal input. Each instruction can have a line number or you can assign one number to groups of instructions. Disassembly can be in decimal or hex. Labels can be any length you like up to 240 characters, and you probably know how impossible it becomes to use labels that convey anything at all after a while if the assembler limits you to six characters. Attention to this sort of detail makes the user feel very comfortable with this program.

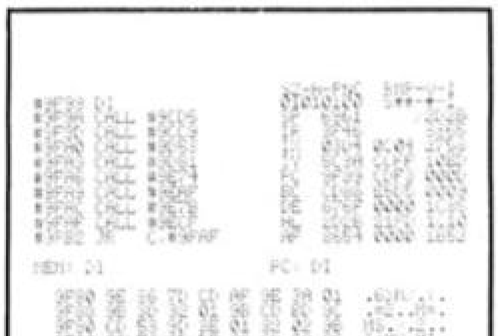
Editor/assembler

There are two tapes. The first, the Editor/Assembler, has all the features you would expect and numerous extra ones. Macro labelling allows procedure definition in the listing. A special set of commands constitute a high level language — Phoenix — which is really intended for testing algorithms, but they can be mixed freely with assembly language, so there is no need to convert a tested routine. A calculator, accessible from the editor, accepts input in all four arithmetic conventions, and will output in whichever base is specified, and in unsigned or two's complement arithmetic.

The editor takes care of tabulation, and you can mix upper and lower case freely. Opcodes are converted to upper case, but labels and notes remain as you entered them. **LOOP, Loop,** and **loop** being recognized as different labels. Error messages are very specific; for example "Space required" above the line you are trying to enter, and a cursor at the spot where the space is needed. String search, find and replace are available, and sections of the listing can be copied, moved or deleted.

The label table can be saved separately and merged into later modules of a long program, avoiding the need to assemble existing modules just to get the labels into memory. You can discard any which are only used inside a subroutine and just carry forward the entry point labels.

Assembly is to screen, tape, microdrive, disk or printer. Conditional assembly is available, so that if your



Screen dump of monitor 'window screen' during disassembly.

program needed, say, to drive a printer interface, you could write subroutines to drive different ones, set the conditional facility to assemble just one and ignore the others, and produce several versions of the program from one listing. The code produced by the assembler is in a special form, so there is a conversion program to translate it to normal code. Either form of code, or the source text, can be saved to tape, microdrive or disk.

Monitor/analyser

The Monitor/Analyser on the second tape is just as powerful. Versions residing high or low in memory are offered, and either can be relocated so that there is no clash between the monitor and the program being examined. The monitor's main screen is divided into four windows: top left — disassembly listings or the memory map; top right — the current state of flags, interrupts, and registers and the top nine items on the stack; centre screen — the contents of the address in the memory pointer and program counter, and the contents, in hex and ASCII, of 64 addresses, with the one in the memory pointer near the middle with a cursor; bottom screen — commands and messages.

Disassembly, which can also be to the whole screen, can be saved with absolute addresses for calls and jumps, or with labels generated allowing the code to be relocated.

The debugging and testing facilities are excellent. You can single step through the code, with the register and stack display updated after ever step. Instructions may be skipped and subroutines called may run at normal speed or single step. Slow running is available, with subroutines at normal or slow speed, with four types of information update. Eighteen types of breakpoint are offered, ranging from the ordinary one returning control to the monitor, to ones which continue in slow mode or resume normal speed execution.

Genius

This is a very versatile test and debugging program and the whole package is most impressive. The one area where I feel improvements could be made is printer interfacing, because Kempston 'E' is the only one guaranteed to work with it.

It seems a pity that such a versatile program in every other direction should not support a wide range of interfaces.

This apart, Laser Genius is a first-class package, straightforward enough for the beginner and versatile enough for the expert. The price amazes me. The program I have been using until now cost me over £22 and has half the facilities this one offers for £14.95. Clearly, excellence is the hallmark of the IQ series.



Assembler screen dump showing text just as you type it in.

UTILITY REVIEW

The Trojan Pen

Carol Brooksbank puts pen to screen with the Trojan Light Pen.

Cadmaster Light Pen
Trojan Products
£14.95

If you always thought of a light pen as being attached to its own interface which plugs into the peripheral port, this one will be a surprise. The twin wires from the pen separate at the end. One has a miniature jack plug attached, and the other a connector plug for a PP3 battery. You load the software supplied, remove the 'ear' plug from the Spectrum and plug the pen in there. The battery simply hangs around on the end of the wire as you work. To be honest, it looks a bit Heath Robinson, and I have to put a question mark over the arrangement's reliability. The model we had to test started working intermittently after a couple of hours, but you could get it going again by pressing the connector to the battery or jiggling the wire.

Perhaps it was just a poor connection on this particular instrument and not a symptom of an arrangement which puts too much strain on a not very strong connector. I hope so, because in other respects this is a very good light pen.

The software

When the software loads, the menu appears and a light touch of the pen on the box alongside an option selects the one you want. There are three thicknesses of normal pen and two of italic, plus a dotted line and an airbrush. You select the ink colour direct from the main menu, but to select paper colour, you touch the pen alongside the colour, and then select the 'New' option which gives a choice of clearing the screen or returning. Either option takes you back to the main menu to choose the ink colour, but the second preserves your current artwork. You then select the drawing mode; freehand, circle, box, line, triangle, or ray, and you will go straight to the drawing screen.

Freehand drawing is where a light pen scores over most software graphics packages, because you have control over the speed. With the Trojan you place the pen over the spot where you want to start and press '1' or 'space'. The key must be held down while you draw so your computer must be quite close to the screen. I found that you need to work fairly slowly or you run ahead of the cursor and it is almost impossible to return the pen to the exact spot to continue a line once you have broken it. The geometric options, box, triangle etc. are easier to position exactly. You place the pen where you want the start of a line, the first corner of a shape or the centre of a circle to be, press the key, and a one pixel cursor appears. Its position is given at the bottom of the screen in x,y co-ordinates and line and column numbers, and you can use the arrow keys to move it. This can be repeated with the circle circumference or the other corners of a shape so you can position it exactly.

Options

The Fill option is efficient, but very slow, almost like a BASIC fill. You have seven textures and solid colour to choose from and the current ink colour is used. If you choose a texture, it is filled first in solid colour and there is then a pause long enough to make you think you chose the wrong option before the texture appears.

There is a Copy option, which offers a choice of small (which turns out to be the same size as the original), large, 2× height and 2× width. You place a box round the area to be copied, select the size and mark the bottom left hand corner of the new position. Again, the position is shown and the arrow keys can be used to adjust. This option is especially useful for varying the appearance of text, because the text option only offers the standard Spectrum typeface.

If you need to erase, the E key will remove the last line or shape drawn. The erase option will take out everything drawn during the last option chosen, and the window option allows you to clear a selected portion of the screen, or you can clear the whole screen. Your artwork can be saved and loaded on tape or Microdrive, and the pen software can also be transferred to Microdrive. I suspect that the BASIC can be altered to use the pen with Wafadrive, and the handbook also gives a sample program to allow you to incorporate the pen operation into your own programs.

You would not expect a light pen to be as sophisticated as the software graphics packages available, but although its options are limited, it is more accurate than I expected it to be. The ability to position lines and shapes with pixel precision is certainly useful. If you want to be the Rembrandt of the small screen you would probably use it to add the freehand drawing and stick to a graphics program for textures, colours and detailed work. But if you want basic drawing and colour facilities then this could be for you, and, above all, it is fun to use.



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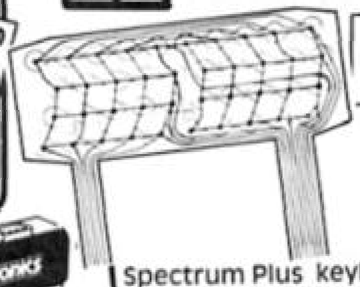
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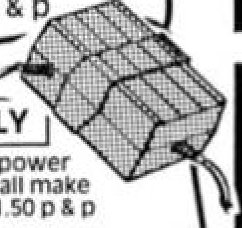


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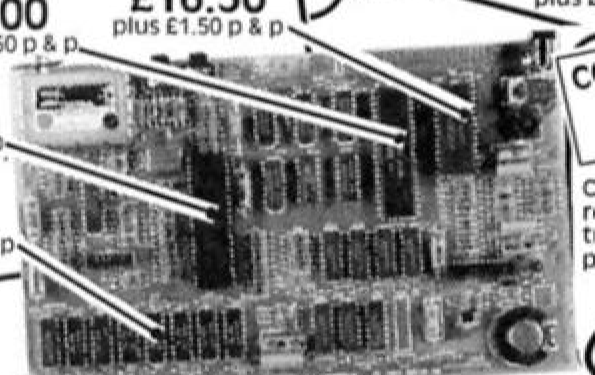


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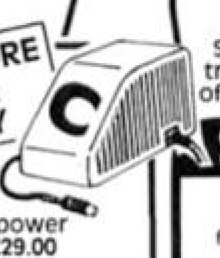


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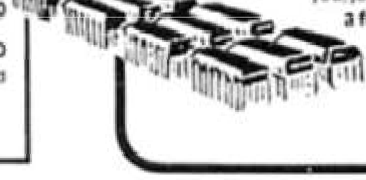


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ZX takes an exclusive first look at Citizen's new printer — the LSP10.

LSP-10 Printer
Citizen
£266

First Impressions

The LSP-10 is a medium sized machine in an off white/cream finish which gives it a classy, professional appearance. A control panel is set at the front on the right and LEDs indicate power, paper out and ready, following this are the three control buttons and they are clearly labelled on line, LF, FF/auto sheet load.

In a separate section in the box is the Tractor Feed unit which can be attached if you want to use continuous paper, the manual and the printer ribbon.

I am a great advocate of reading manuals, some can be so literally translated as to be incomprehensible, but are good for a laugh. Others, such as the old Epson ones were so technically detailed that you needed to be an expert to understand them.

The LSP-10, as I suspected from reading the 120D manual, is written with a non computer specialist in mind. It is well written and not a rough translation, clearly set out with the intention of getting the user operating it with the minimum of fuss. I set the printer up in less than ten minutes and such details as being fitted with a standard mains plug helped a lot.

So, we were off to a great start.

Tech Specs

So that you can compare its features with those of other printers I will give you the technical specifications at this stage (CPS = Characters Per Second, NLQ = Near Letter Quality). 120 CPS in draft mode and 25 CPS in NLQ.

Bidirectional print in text mode, undirectional in graphics. Dot Matrix printer, 9x9 dot character form, but 8x9 in practice. Print density is 60, 120 or 240 dots per inch in graphics mode (producing 480, 960 and 1920 columns per line with corresponding densities in IBM mode). The LSP-10 is Epson and IBM compatible.

Centronics is fitted as standard and RS232 is available as an option. There are user defined graphics plus built in Epson and IBM graphics set as well as 11 international character sets.

All the usual print modes are provided, pica, elite, proportional, compressed, emphasized, doublestrike, expanded, italics, underlining, reverse (inverse), superscript, subscript and an unusual option of overscoring.

As you can see, the LSP-10 provides all the features of other printers of its type and a few extra as well. The next step, and possibly the most important, is how easy is it to use these features.

Citizen LSP-10 Competition

I think the life expectancy is

☐ 10,000,000 characters

☐ 50,000,000 characters

☐ 100,000,000 characters

How large is the LSP10's buffer?

☐ 2K ☐ 3K ☐ 4K

What is the LSP10's print speed in NLQ mode?

☐ 5 CPS ☐ 25 CPS ☐ 250 CPS

Name..

Address..

....

Send this coupon to Citizen LSP-10 Competition, ZX Computing Monthly, No 1 Golden Square, London W1R 3AB. Entries to arrive by August 8th 1986.

In use

To start with, several operations are accessable from the front panel, these are pica, NLQ (or correspondence quality as they insist on calling it), italic, emphasized, reduced and the beep disabled/enabled function. The positioning of these features is ideal if like most people you position your printer slightly higher than your computer.

Accessing these functions is done by putting the printer on line (the only instruction omitted in the manual that I could find!) and then holding the FF button and pressing the on line button. Each subsequent press of the on line button steps through the modes. Once selected you exit this operation by pressing FF and then LF.

Yes, I thought this sounded confusing when I read it, but in practice it was pleasingly simple and easy to master, a lot better than the usual rigmarole of sending 57 varieties of control codes. Of course you can always change fonts that way if you want to be awkward!

All the normal ESC + codes are supported and these can be sent as per the usual system to access the other operational modes.

I used it with Tasword 2, the ZXLprint 3 Centronics interface and the Kempston E Centronics interface and it worked perfectly, first time.

I tried it with graphics utilities such as Tasprint and Cap Software's Designer and it worked away happily.

When plugged into the Technology Research Ltd Centronics interface and the QL it operated perfectly with the Quill and produced superb prints from Graphiql screens.

Final comments

The NLQ, oh all right, CQ mode produces print of a very high quality and even draft mode is more than acceptable in quality. There is a 4K buffer built in which, though not capable of holding more than a single page, can be very useful when writing several short letters or pages.

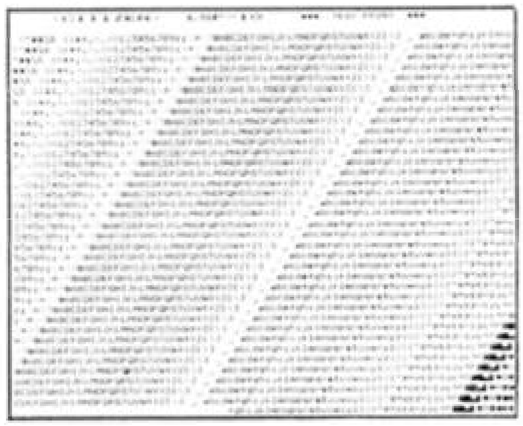
The noise level is acceptable and speed was very fast, even at 25 CPS in NLQ it is not too slow.

I have known some printers where to change the settings on the DIP switches (used to set the power up stage — ie. IBM/EPSON slashed/non slashed zero etc.) you have to dismantle the printer and use a special device available only at a certain shop situated 500 miles away.

But, this printer uses the Centronics/RS232 interface card which simply plugs into the RH side of the printer. Why don't all

RESPECTED CITIZEN COMPETITION





manufacturers design things so simply and logically!

Overall

I can only assume that this printer is intended as an alternative to the 120D, it is similar yet has subtle differences that makes spending the extra few pounds very worthwhile. In fact I cannot see anyone buying the older machine. Save up, borrow or beg the extra cash and get this one, you'll probably never buy another.

Competition

ZX readers have the chance to win the LSP-10 printer in our easy to enter competition. Among the LSP-10's specifications is the number of characters the LSP-10's printhead can print during its working life, plus various other details. What you have to do is find the relevant details and tick the appropriate boxes on the coupon.

The competition is open to all ZX readers except employees of Argus Specialist Publications, Alabaster Passmore and Sons and Citizen. Closing date for the competition is August 8th 1986.



Stonechip keyboard
Stonechip Electronics
£69

The Stonechip Keyboard, an update for the rubber-key versions, has the great advantage of being very easy to install. The Spectrum case does not even have to be opened. The complete machine is installed inside the Stonechip case and connected via the peripheral port edge connector, so the Spectrum guarantee is not invalidated. There is another port on the Stonechip, so peripherals can still be attached, but it tends to be a rather unstable connection, giving rise to crashes which are all too reminiscent of the 'ram-pack wobble' of the bad old ZX81 days. I frequently have to wriggle the connectors for several minutes before the keyboard and my Wafadrive will work happily together, and have learnt — the hard way — to save everything on tape before trying to print or to save on wafer, in case the connector has wobbled and using the Wafadrive causes a crash. Without the keyboard, the Wafadrive behaves normally.

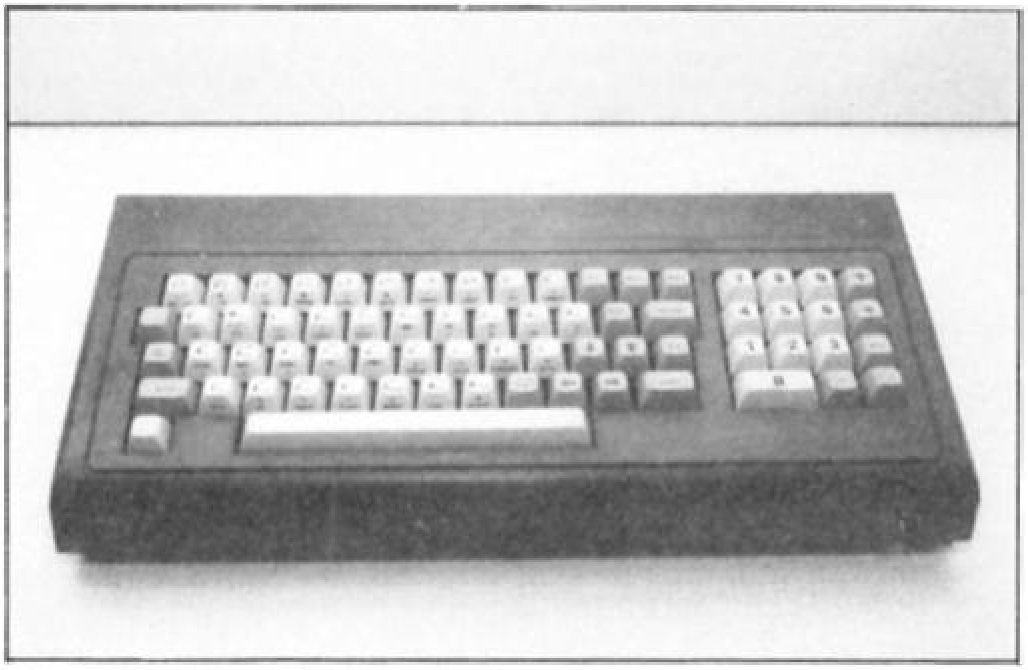
The keyboard layout is very similar to the rubber-key Spectrum, the only extra keys being delete, E-mode, space bar, and two keys which must be pressed simultaneously for a system reset. Although it lacks a caps lock key or second shift keys the action has an authentic typewriter feel, and quite fast typing speeds can be managed on the Stonechip. The chunky grey keys are printed in four colours: white letters and keywords, red symbol shift characters and green E-mode keywords are all on top of the keys. E-mode+symbol shift characters are on the front of the keys in blue. This makes the keyboard very easy to use for programming or word processing, but after a year's use the printing has completely rubbed off the most used keys. There is a load/beep/save switch, which eliminates plug pulling while saving, and a built-in beep amplifier with high, medium and low settings, which greatly improves the Spectrum's usual squeak.

The keyboard originally cost £69, though since Stonechip folded it has been possible to pick them up for less than half that, but unless you particularly want a save/load switch and beep amplifier, the Spectrum+ upgrade is better value for money.

Carol Brooksbank

keyboard

Our all-star reviewing team get to grips with the alternatives



68FX keyboard
LMT
£39.95

There are two LMT series boards; the 68FX1 and the 68FX2. They are both very similar, except that the earlier board had about three blank keys. The case consists of a metal base fitting into a strong plastic case, narrowing and longer than the DK'tronics case, but of similar material; similarly, it is easily worked with a hacksaw. Although I have reservations about a metal base next to the Spectrum circuit board, it is nevertheless well designed, and the board is simple to fit — about five minutes' work. Microdrives are easily fitted. Most peripherals also fit relatively easily. The key-caps are in two tasteful shades of grey and are screen-printed (no sticky labels here). They are mounted in a robust metal frame as well as on a rather complex printed ciruit board. There is a separate numeric pad, with some calculator functions. The keys themselves are very superior; they are proper key-switches, and have a good feel to them. There are quite a lot of single-key-entry keys: full stop, comma, caps lock, extended mode, edit, delete, break, run-and-enter, minus, star, slash, numeric pad enter and decimal point keys and all four single entry cursor keys. (unlikely to work with many games). Whilst the general arrangement of these is not standard typewriter, the existing keys are easy to modify for anyone (even me) with a rudimentary knowledge of electronics; for each key you usually need a transistor and a least two diodes.

However, on the plus side, there is already a well placed caps shift with a nice large key at either end of the board. In spite of my criticisms, I rate this a good keyboard, with some minor snags. At £39.95 it represents excellent value and I recommend it strongly.

John Wase



Lo Profile
Saga Systems
£39.95

The Lo Profile was originally produced by Advanced Memory Systems (of AMX Mouse fame) and priced at £59.95 until Saga, who have close to a total monopoly on the keyboard market these days, bought the rights and cut the price by £10 to bring it into line with the rest of their range.

Installation of the keyboard was quite simple: you only have to remove the top of the Spectrum's own keyboard and then the rest of the computer fits bodily into the new keyboard, so you don't have to do any fiddling about with screwdrivers on the circuit board itself (which always makes me a bit nervous).

The Lo Profile doesn't provide new keys, and simply provides a better version of the standard Spectrum keyboard. There is a large space bar set on its own right at the front of the board, which is quite useful, and a group of numerical keys set off to the right hand side, but apart from these there are no extra keys (for things like commas and full stops for instance, which require you to enter Extended or Symbol Shift mode).

The keys themselves are strong moulded plastic with all the keywords engraved and coloured so that they're clear and unlikely to wear off as they are on some other boards. The action of the keys is controlled by springs (I think) and they require a fairly firm press in order to print the character onscreen. I've never found this a problem with my own typing speed though I'm told that it might slow down a good touch typist.

Despite having fewer extra keys than most of the other Saga boards the Lo Profile is very wide. Much of the board's width is just empty space on either side of all the keys which doesn't really serve much purpose, especially since much of the keyboard is hollow inside so there's no real reason for all that 'dead' space. This doesn't affect the keyboard's performance in any way, but it does take up quite a lot of desk space.

The Lo Profile has considerably fewer frills than some of its competition, but it is a perfectly sound piece of hardware. And, as one of the cheaper boards on the market it's quite good value and preferable to Sinclair's own upgrade.

Stephen Dean

capers

to the infamous Spectrum keyboard.

Saga 1 Emperor
Saga Systems
£39.95

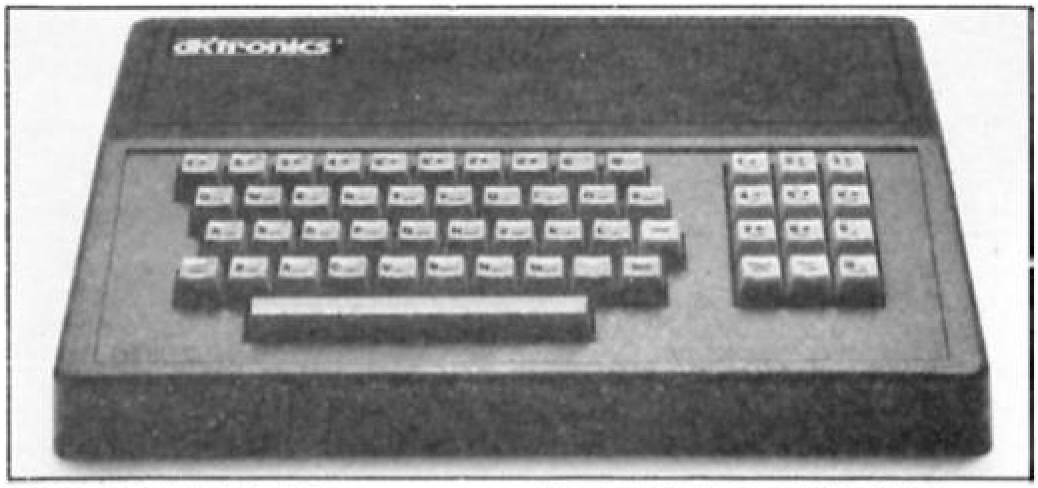
This is a good-looker. It is white, slim, with a groove for a pen, posh lettering, big square keys and lots of them. Fitting is a doddle — you retain the Spectrum base and add the top, fitting in the new ribbon cables; about five minutes. The keys themselves operate on a membrane but the 'feel' is really not bad at all; quite comparable with the DK'tronics, for instance. They are lettered, however, with the same do-it-yourself system that DK'tronics recently discarded — and the problem of these sticky tabs is that the printing wears off the front leaving the keys unlabled. The trouble with this board is that it looks as though you have a lot of additional single-entry keys. In fact, you have not. What you have got is a lot of dupli-cated keys bunched round the appropriate shift key and somewhat misleadingly labelled as the shifted character: you have to press the two adjacent keys down together to get the character you want. This is fine for use in programming, where



Sinclair's single-key entry system discourages typing, but pretty awful when it comes to word-processing or any other occasion when entering text is necessary. Moreover, being a membrane system, you are stuck with the maker's arrangement of keys; it can't be modified. And some versions had capacitance problems; certain programs (Betabasic, for instance) wouldn't run without a program patch or a hardware modification. On the plus side, most peripherals fit, and it is robust and reliable — it has to be, for ours currently sits in a classroom in a junior school and gets a touch of the heavy hand only too frequently. At present, it is advertised at £39.95, which compares rather poorly with the DK'tronics, which has a numeric pad. However, it is far less likely to need an add-on ribbon connector for adding peripherals, and it looks a lot posher. Provided that you were not particularly interested in word processing, but, instead, wanted an add-on keyboard for programming, and didn't want to input large amounts of numerical data, then perhaps this is just the keyboard for you.

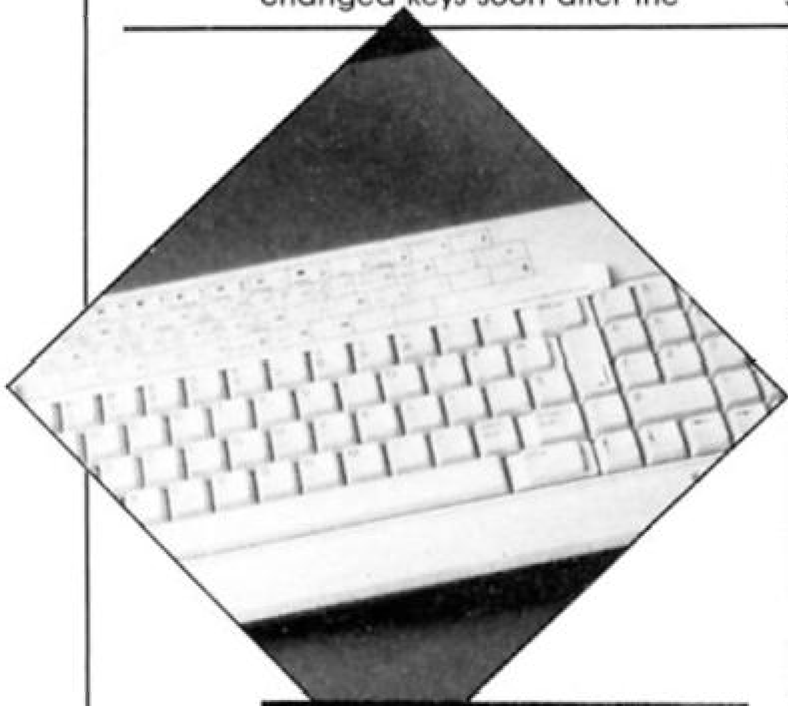
John Wase

DK'tronics keyboard
DK'tronics
£37.50



The DK'tronics keyboard has had a long history in Sinclair terms. It is sturdy, in a large black plastic case with a sloped back which gets in the way of some peripherals, but is easily hacksawed when the need arises. The box is capacious, and is designed to take the Spectrum printed circuit board; even a buffoon like me can fit it in five mintues. There is also room for interface 1 (but this can foul the sloping back which has to be pared inside in some versions). The power supply can also be mounted inside, and there is a connector for microdrives. The sloping back prevents many of the standard accessories being fitted direct to the back — you'll need to buy a ribbon connector. Originally introduced for the ZX81 (without space bar) it was fitted right from the start with individual key-switches of the deforming-membrane type. These are by no means the best, but incredibly better than the old rubber buttons, or even the Spectrum+ keyboard. DK'tronics changed keys soon after the space-bar version was introduced; the older switches had a rather better feel. A touch of the do-it-yourself was provided in stick-on labels which wear in use, leaving anonymous keys, now, thanks heavens, superseded by screen-printed keycaps. The number of keys is minimal, and their layout standard only in respect of the letters; there is no single-key comma or full stop, and the shift keys are not arranged so that standard touch-typing is available. On the plus side, there is a numeric pad, ideal for entering lots of data, and a single-key delete. The circuit-board design is simple and straight-forward and is very easy to modify. My modified keyboard has been in use for a very considerable time and is used for typing on average several hours a day; it has stood up well to this hammering. If the keyboard feel and layout are sufficient for your purpose, then buy it; it is a robust, honest product which will serve you well. Currently advertised at various prices, you should be able to get it for just over £30 if you shop around, or for £37.50 if you order direct from DK'tronics. And at only £10 more than Sinclair's own upgrade (for the 48K to the Spectrum+) this represents good value.

John Wase



Saga 3 Elite
Saga Systems
£69.95

I admit that I had one or two problems getting this installed, because of the unexplained doohickey that came along with the keyboard. It turned out that this had to be connected to the keyboard membrane before it could be connected to the Spectrum's ciruit board. However, once I got that sorted the Saga 3 rapidly took first place over the other keyboard that I'd been using.

Unlike most other keyboards, the Saga 3 does not have all the Sinclair Basic keywords and symbols marked on the keys. Instead, each key has just the relevant letter of the alphabet, and all the other information about keywords etc, is printed onto a loose plastic strip that can be used or put to one side as needed. This automatically makes the keyboard look much tidier than any other that I've seen, and the smooth action of the keys makes it an ideal choice for uses such as word processing. But when you need to do a bit of programming there is a small cluster of keys on the left hand side of the keyboard which are reserved for some of the most often used keywords (LOAD,SAVE,RUN and so on).

There is also a second cluster of keys on the right hand side, which you could call the calculator cluster. This contains all the numerical keys and keys for maths operations (addition, subtraction etc.), laid out as they would be on a calculator. This set of keys also contains an additional four cursor keys which come in handy when editing text or program lines. The inclusion and layout of these two sets of keys is well thought out and can save quite a lot of time as they remove the need to enter different modes and press loads of different keys by providing single key options for some of the most often used functions.

The main keyboard itself is nicely raked and the keys themselves are large, with slightly curved surfaces which makes it pleasant to use for faster, more experienced typists. There's a large space bar and additional keys for some of the more common punctuation marks, which again saves time in entering extended mode for commas, full stops and the like. There's even a small trough right at the back of the keyboard where you can hold pens and rulers.

The only criticism I have of the Saga 3 is that the delete key is stuck right out on the bottom right hand corner, and I've found that with the number of corrections I usually have to make when I'm doing any word processing it would be better to have the delete key closer to hand (somewhere near the space bar perhaps). Even so, this is must a minor quibble and doesn't stop me from concluding that this is by far the best add-on keyboard that is currently available, and that it certainly justifies its price if you need a decent keyboard for anything other than games playing.

Stephen Dean

Saga Keyboards, 2 Eve Road, Woking, Surrey GU21 4JT (04862-22977)
DK'tronics, Longs Industrial Estate, Garleston, Gt Yarmough (0493-602926)
LMT South Street Commercial Centre, Bishops Stortford, Hertfordshire 3M23 3AL (0279 724817)

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CROSSFIRE

Crossfire is here to express readers' opinions on all aspects of computing with Sinclair machines. Why not drop ZX a line?

Machine Code queries

I have been a subscriber to ZX Computing since the first issue (summer 1982) and have found it uniformly excellent, but now that so much of the programming given is in machine code I am afraid that one important point has been completely ignored by all computer magazines that I have seen.

The giving of checksums helps a bit (although these are not 100% accurate) but nowhere have I been able to find out how to correct errors short of re-typing from the beginning which, to say the least, is a bit of a bore!

At 82 I am a bit old to learn new tricks and, although I have no difficulty in correcting errors in Sinclair Basic, I am afraid that re-typing the whole of a machine code programme (I do not speak American) is more than I can stomach.

Another thing that bothers me is the increasingly frequent numbers of cassettes on sale for round about £9.95 that will not load, either reverting to the copywright sign or freezing the moment they have loaded. I have two cassette recorders of different makes, both of which give exactly the same results.

I have no trouble whatsoever with programmes that I have entered myself (in Basic of course!).
F. Wade-Cooper, Burgess Hill.

News from Canada

I noticed in your news column that some of your readers are having problems in finding thermal paper for their printers.

I wish to point out that Radio Shack (TANDY) has thermal paper which is better quality paper, even though it is roughly ⅛ thinner. I've used that paper for two years now, mainly because it was cheaper (two rolls for $5.95 CDN.) and better. And no problems in getting it or using it.

I'm currently running a T/S 1000 with Memotech 64K and Centronic interface attached to a Tandy DMP-105 Printer. I have no problems interfacing with it. My interface is from "EPROM SERVICES" (3 Wedgewood Drive, Leeds LS8 1EF. Phone 0532 667183) and is also compatible with the SPECTRUM. (Costs $89.00 CDN.) It is dual centronic interface that is port mapped using ports BB, AB, 9B and 8B.

Larken Electronics has just come out with a ZX 81 Disk Drive Controller Board. They claim that it will store 160K on a 5¼ disc at a rate of 125K per second. It requires a "SHUGART 455" or compatible double-sided drive. User Directory command — DIRECTORY, LOAD, SAVE, FORMAT, DELETE and EXIT. The power LDOS on Eprom, loads or saves, Basic Programs, Machine Code or Arrays. The DOS USES 12 to 16K area of Memory: 2K RAM on disc controller. Uses no ZX 81 RAM, and RAM packs and peripherals connect to Controller. The controller is connected to ZX 81 by way of ribbon cable. Cost is $119.95 CDN. plus $4.00 CDN. shipping.

Write to: Larken Electronics, RR 2 NAVAN ONTARIO, CANADA K4B 1H9 for further details.

Peter McMullin has written a newer version of "WORD SINC" a 80 column, 64K word processor for the T/S 1000 or ZX 81 called "WORD SINC 11.5 and 11.56. In 64K, there is space for 39030 characters and many programmable printer functions. I have five other word processor programmes, but this one is the only one that I use. It is simple, fast, easy to change to use and suits many requirements, capable of either text or graphic print out. If you wish to review this program, let me know and I'll send you the complete copy and manuals.

Write to: Peter McMullin, 2340 Queen Street East, Toronto, Ontario, Canada M4E 1G9 for further details.
R. Meijering, Winniped, Canada.

Astronomical Communicatons

I would be most grateful if the details of my viewdata/bulletin board Prometheus can be included in the letters section of your next publication.

The system has been primarily set up with astronomy as its central theme, although many of the system's features prove to be of genuine use to serious amateurs, I equally intend the system to be of real interest and educational value, particularly to the young. The database has been constructed with sections that appeal more readily to junior stargazers, and more are planned.

British Telecom have now assured me that a dedicated line will be available soon, this fact will not affect the system number (Prometheus — Viewdata 01-300 7177).
B.J.G. Spencer.

Max is finished

I have just completed Max Headroom by Quicksilva, their latest and most addictive game.

I have received Max's personal message and thought that the graphics were very impressive but the speech is rather hard to understand due to lack of sound capabilities on the SPECTRUM 48K, but I managed to pick out this:

"I have only 30 seconds and you brainless computer wimp is sitting there in front of your computer when I have only 30 seconds. All I want to say is this... this... this... this... congratulations and give my love to the family, cheerio, see you later, bye... bye... bye... bye..."

I like the presentation of ZX Computing magazine, but I think the rating should be more detailed. I like the idea of a monster to show the overall rating of a game but you should also show a percentage for graphics, sound, value, playability and presentation. Apart from this small point your magazine is first class!
Tim French, Chichester.

Attention Wafadrive owners

I wish to contact other wafadrive owners who would be interested in exchanging ideas and helpful hints.

Also if any wafadrive users are interested in getting Gilsoft's the Quill to read and write to wafer I would be more than pleased to hear from them as Gilsoft tell me that if I can find enough users they will strongly consider bringing out a wafadrive version.

Spectrum owners in Cornwall might be interested to know about the Mid Cornwall Co-op Computer Club. We are the largest computer club in Cornwall and meet every Monday evening at 7.15 to 9.30 in Roche, Cornwall.

Further details on both wafadrive matters and the club can be obtained from Mike Richards, 8 Victoria Road, Roche, Cornwall PL26 8JF (0726 890473).

MINDPLAY

Our man in the dungeon, Peter Sweasey, casts his eye over a new US Gold adventure and re-visits Valkyrie 17.



"His body is covered with an orange, flexible, rocky textured hide. . .he has no apparent neck and has four toes and fingers. . .the mutagenic, specific-frequency cosmic ray bombardment caused his musculature, bone structure. . .to greatly increase in density." Who does this describe? No, not Bryan, my hideously savage editor, but the star of one of the games reviewed this issue. Find out who it is in a paragraph or two.

I am still languishing here in the deepest, darkest, dampest depths of Argus Press Towers. News of slavery being abolished has not yet reached Bryan.

Still, at least some adventures have finally been released, so I have something to do other than listen to the sound of dripping, cold custard (a unique form of torture known only to barbaric Bryan). Ariolasoft have re-released an old favourite of mine, Valkyrie 17, first out in 1984 from the RamJam Corporation. Then US Gold surprise everyone by actually releasing a game without it having been advertised for six months beforehand; Questprobe 3 starring the Thing (described earlier) and Human Torch, written by famed American adventure writer Scott Adams. (Well, it hasn't been advertised by THEM for very long, but the now departed Adventure International had been promoting it before Christmas.)

Anyway, it's about time too Scott — it's been over a year since the last one. At this rate, the Questprobe series, planned to run to 12, will be going well into the next decade. Strange, considering Scott has said that his games only take a few weeks to write (not surprising when you consider how small and linear they are). By the way — can you think of 12 Marvel super-heroes? No, neither can I, and Scott has used the most famous ones, such as the Hulk, first. I can only guess that he will start re-using these later in the series.

But what you really want to know is have Ocean released Hunchback the Adventure yet? Do pigs fly, I am tempted to respond. Half a year late now! Is it something in Manchester's water supply which makes them work so slowly? (Ocean are talking about a June release — hang on—Ed.) Level 9's newie should also have reached me, but it's only a week or so late and will probably be out by the time you read this. However, enough of the mindless tittle tattle — on with the reviews!

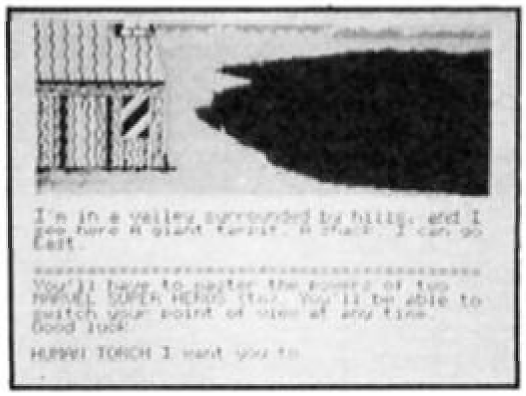
QUESTPROBE
US Gold
£9.95

In the third of the Questprobe series, you control both the incredibly strong (and imaginatively named) Thing and The Human Torch, who can, as his name suggests, turn into a flaming mass. Your task is to rescue Alicia Masters from the evil Doctor Doom, which makes a change from collecting gems as in other Scott Adams games.

Otherwise there is not much difference between this and the others. The graphics are often stunning, and really catch comic book style. There are some difficult puzzles, probably Adams' most endearing quality; the first, involving a tar pit, will prove popular with the helpline I'm sure. But the text is pathetically brief, with virtually no description. A useful complete list of vocabulary is given, and it runs to 700 words. Some of these are plurals however, and when playing, the parser still feels restrictive. The responses are limited, and the game has an annoying habit of printing OK if it understands the first word of your input — even if the rest of it is absolute rubbish, or before any messages (for example, "OK Sorry I can't", which is just sloppy English).

Questprobe 3 is not a bad game in itself, but when compared with products like Level 9 games, or even some budget titles, it is weak. Adams has produced better, such as Spiderman. Unless you like tough problems or pretty pictures, I wouldn't recommend it; and as for the US Gold claims that "Scott Adams is the undisputed master of the art of adventure writing" — I'm disputing it!









VALKYRIE 17
RamJam
distributed by Ariolasoft
£9.95

Ah, nostalgia. I first reviewed this game for Home Computing Weekly in 1984 and loved it, to quote: "One of the best adventures of the year — buy it!" Has it stood up to the test of time?

Before I answer that question, the plot. A series of garbled telephone messages (reproduced on the B-side of the cassette incidentally) reveal that Valkyrie 17, a hideous super-weapon developed by the nazis, is active again. You fly out to the Hotel Blitz in Lake Bruntz, where your secret agent contact was murdered. Can you find and stop this deadly machine? Basically an espionage plot then, not amazingly original, but I cannot offhand think of a better executed one for the Spectrum.

At the hotel bar, where you start, is a girl who would "lof a trink, dollinsk". Nearby is the manager, who demands you pay your bill before leaving, and will use martial arts to persuade you if necessary. Answer the phone and you will be told "The Red Kipper Flies at Midnight". Search around a bit more and you'll find a wig and dress. Should you wear them? Do they suit you? When you escape the hotel, how do you descend the ski slope?

These are just a few of many confusing aspects to this wonderful, polished adventure. It has some graphics, which are fairly average by today's standards but still attractive.

What makes V17 so good however is the intelligent, lengthy and humorous text, and responses. Just a small example is this one. Searching around in an attempt to leave you find the dusty cupboard where the maid keeps her brooms. Having looked around inside, "A chambermaid appears and politely asks if you have been standing in the broom cupboard. She dusts you down and leaves". That sort of attention to detail and clever forethought is rarely seen in Spectrum adventures.

The vocabulary is friendly and your interest is maintained for a long time by a varied range of responses. The problems are all logical, not obscure; perseverance and thought will ensure you complete the game eventually. The response time is a little sluggish, but not offputtingly so, and certainly not as bad as in Lord Of The Rings. The game is also pleasantly atmospheric and well presented.

When first released, V17 came in a well designed box, with an information dossier and a free Valkyrie 17 badge; exactly what adventure packaging should be, but sadly not seen on the Speccy very often. The real shame is that Ariolasoft have done away with this, put it in an ordinary cassette box and squashed all the information into a fold out inlay. Also, considering its age, I think this is a little overpriced.

But these points aside, V17 is great fun and remains one of my favourite Spectrum adventures. I have no reservations in awarding it a Monster Hit; can't wait for the sequel. Ironic really, that the best game I have reviewed for months is nearly two years old...



CASTLE THADE
Spectrum
Adventure Exchange Club
£5.00

Win a colour monitor if you can solve the coded message at the end of this competition adventure. Your task is to free the Land of Kral from the Lord of Darkness by entering his domain (the fortress of the title).

Actually this terribly unoriginal plot is irrelevant, because it's an excuse for loads of entertaining, tricky puzzles to be assembled as a test for more advanced adventurers. Plenty of often ingenious sticky situations, with some infuriating mazes thrown in. Another particularly likeable touch is the inclusion of a useful RAM SAVE/LOAD command.

The most impressive feature of the game however is the text; at times astonishingly verbose and lengthy for what is, after all, a Quilled Spectrum game. Atmospheric, descriptive, and important to read — vital clues to problems are buried deep within...

Something had to suffer to fit it all in memory; unfortunately this was vocabulary and messages. The former is very tight (a common flaw in Quilled products), whilst the lack of the latter makes play less fun and harder — an unresponsive EXAMINE command for example, somewhat counteracts the brilliance of the text. You seem to be able to do very little apart from what is necessary to solve the game.

Castle Thade is a surprisingly worthy product (when I first saw the amateur presentation, my heart sank). The puzzles and text are excellent, sadly marred by the points I've mentioned. Still, sensibly cheap and recommended to the hardened adventurer. Available mail order only, from: 4 Kilmartin Lane, Carluke, Lanarkshire ML8 5RT. Incidentally, I'll be looking at the services offered by the club who produced this next issue.



HELPLINE

R. Rutherford of Ashley in Sussex writes about the Adventure International **Robin of Sherwood** game (a right turkey I reckon, even more wooden than Jason Connery's acting in the current series). "How do I get out of the dungeon?" he asks. First of all you need to STAND ON PRISONERS (they don't mind, surprisingly). If you don't hear any footsteps CALL GUARD until you do. Then GRAB ANKLE, STRANGLE GUARD, EXAMINE GUARD, GET SWORD, OPEN BOLT, OPEN GRATING, GO OUT. Ah, if only escape from these depths were so easy.

Marcus Beer from Sittingbourne in Kent is stuck in none other than **Valkyrie 17:** he was obviously lucky enough to buy it the first time round. He has two problems: how to start the airplane and what is in room 20. Taking the latter first, find out yourself by going in. Pay your bill with the money from the pawnbrokers, then buy the girl a drink with the change. She will go off to powder her nose, but will leave her handbag, which could be worth looking at. As for the 'plane, you need to fill it with fuel (MOVE STRAW to find some), open the hanger doors, start 'plane, and take off. But that should be done at the end.

Chris Geggus from Romford is one of several people who have requested help with **Lord Of The Rings** this month. He writes "The only way into Bree seems to be by giving your name, thereupon the black riders do the nasty — any suggestions?" The answer is in the book, Chris. Frodo asks to be known as Mr. Underhill. So SAY TO GATEKEEPER "UNDERHILL" (not MR. Underhill, which the gatekeeper won't recognise). Meanwhile Andrew McMaster wants to know how to persuade Strider to follow him at the end of game one. When you reach the bridge with the picture, he will stop. Tell him to GO EAST. At first he refuses but eventually he will agree.

Martin Luscombe of Bournemouth asks for **Spiderman** help; it seems Sandman refuses to be kicked about. The answer is to use your super-hero powers and jump onto the ceiling outside. Then you won't be treading on him, so he won't become so angry. Once in that room, EXAMINE everything — more than once. Dave Ward from Middlesex also wrote about the arachnid Marvel creation, asking for some general hints. Amongst those I sent him were these. PUSH UP in the shaft to progress further; reduce the thermostat to freeze away your watery problems; and talk to Madame Webb — she'll help.

Donald Taylor is stuck in a cheapo adventure from Mastertronic, **See Kaa of Assiah.** "I cannot get the rod of light out of the ice," he writes from deepest Cumbria. You need to open the red valve, and light gas when wearing the cloak and carrying only the torch. Then open the green valve and the ice will melt.

Shelia Thow writes about Melbourne House's social climbing adventure, **Hampstead**. She cannot open the filing cabinet. You need to FORCE CABINET — if I remember rightly you need the screwdriver as well.

Sean Renahan from Tonbridge in Kent writes about Fergus McNeil's satirical **Bored Of The Rings**. What can he do in part 2 once he has found the poster of Rocky? Well, from the alcove where you found it, go WEST, WEST, SOUTH and DROP POSTER. Move away quickly (tasteless joke if you linger), then NORTH, WEST and PRESS RED BUTTON. In part 1, Ian Stockdale asks for some general hints. Well CRY HELP to escape the willow, enter Tim's house for some magic beans (don't eat them), and take the mountain top pepper to open the Gate of Morona (drop it there).

I must give a special mention to John Wilson, a master adventurer (far more accomplished than me) from Rochdale). An old correspondent from my days at Home Computing Weekly, John continues to send in excellent and invaluable hints and solutions, which make my job a good deal easier. (I shouldn't be writing this, Bryan might dock my gruel allowance.) Many thanks indeed John.

And finally, if you have been waiting all month for the next part of the Runestone solution — it's been postponed, due to so much mail being received (more of which will be printed next issue). If you are really desperate for more hints, drop me a line and I'll forward them.

Write to me

Everyone who wrote in to issue one should have received some sort of personal reply by now; as should most of the people writing with coupons from issues since. Sometimes it takes me a little time to work out a solution, but providing you have enclosed an SAE I will reply eventually. It's encouraging to see so much mail coming through after my desperate pleas. Keep it flowing in! I have this escape plan that involves building a pile of coupons up to the dungeon window. . .

I'm a little disappointed though that you have only been sending problems. I also want to hear from you if you have solutions to offer, in particular for the Mysterious Adventures series or Mordon's Quest. Just let me know on the coupon.

So, get your quill pens out and start scratching. Missives and tunelling gear to: Mindplay, Horribly Damp Press Dungeons, ZX Computing Monthly, No. 1 Golden Square, London W1R 3AB. Next month I will be looking at some adventure clubs; and hopefully reviewing the latest games from Level 9 and RamJam. Until then, auf wiedersehen, my friends. . .

Title: ....

Company: ....

Problem: ....

....

....

I can help solve: ....

Name: ....

Address: ....

....

QL COLUMN

Brian Becket with good and bad news for the QL

First the good news! May's ZX Microfair had some nice products for the QL including the long-awaited mouse package from Eidersoft. Selling at £89.95, Eidersoft's three-button **QL mouse** comes with the company's ICE desk-top icondriven software (in ROM format) and an elaborate ARTice program on microdrive. Having used earlier versions of ICE via the cursor keys, the mouse-driven version is a delight and well worth having waited for.

The mouse interface/ICE module plugs into the QL's ROM port which is a bit of a hassle as just about every piece of quality stuff coming out these days uses it but the product is exactly what the QL needs — or, more accurately, needed when it was being launched as a new-generation micro for the small businessman who couldn't afford an IBM. My only serious criticism is that the interface could have been better designed. It doesn't really fit properly into the back of the QL unless you use the small leg attachments that Sinclair put into the box more as an afterthought than anything else. These "legs" are pretty much of a pain to begin with and — with certain add-ons in the expansion slot — are next to useless.

I also got a chance to look over the most recent up-date of the QL tool-kit from CAre Electronics and **QJump** (29.95) which adds a goodly number of useful commands and improvements to Superbasic. The latest version is a decided improvement on what went before and anybody intending to do serious programming in Superbasic ought to consider buying it rather sooner than later. It too comes on a ROM cartridge so sadly you can't draw on it with your Eidersoft mouse installed.

Eidersoft was also exibiting its new **QL Karate** game (£14.95) which has some excellent graphics and challenging skill levels for those of you who enjoy simulating beating seven shades of blue light out of strangers. My eight-year-old son loves the game which is a credit to Eidersoft however much it may reflect upon his up-bringing. He also likes Datalink's new 3D-Slime (£12.95) but finds it a shade more difficult to play than Karate. Again the graphics are excellent and the game is probably a bit more of a mental challenge than Karate although both are badly needed in the QL games stable. For adults, Leisure Genius' **QL Scrabble** (£14.95) is the only recent addition to more conventional pastimes and a very good product for those who enjoy the game. My wife still finds it a challenge (those of you who are beginning to suspect that my family doubles-up as a QL experimental control group are not far wrong) and doesn't normally like computer games.

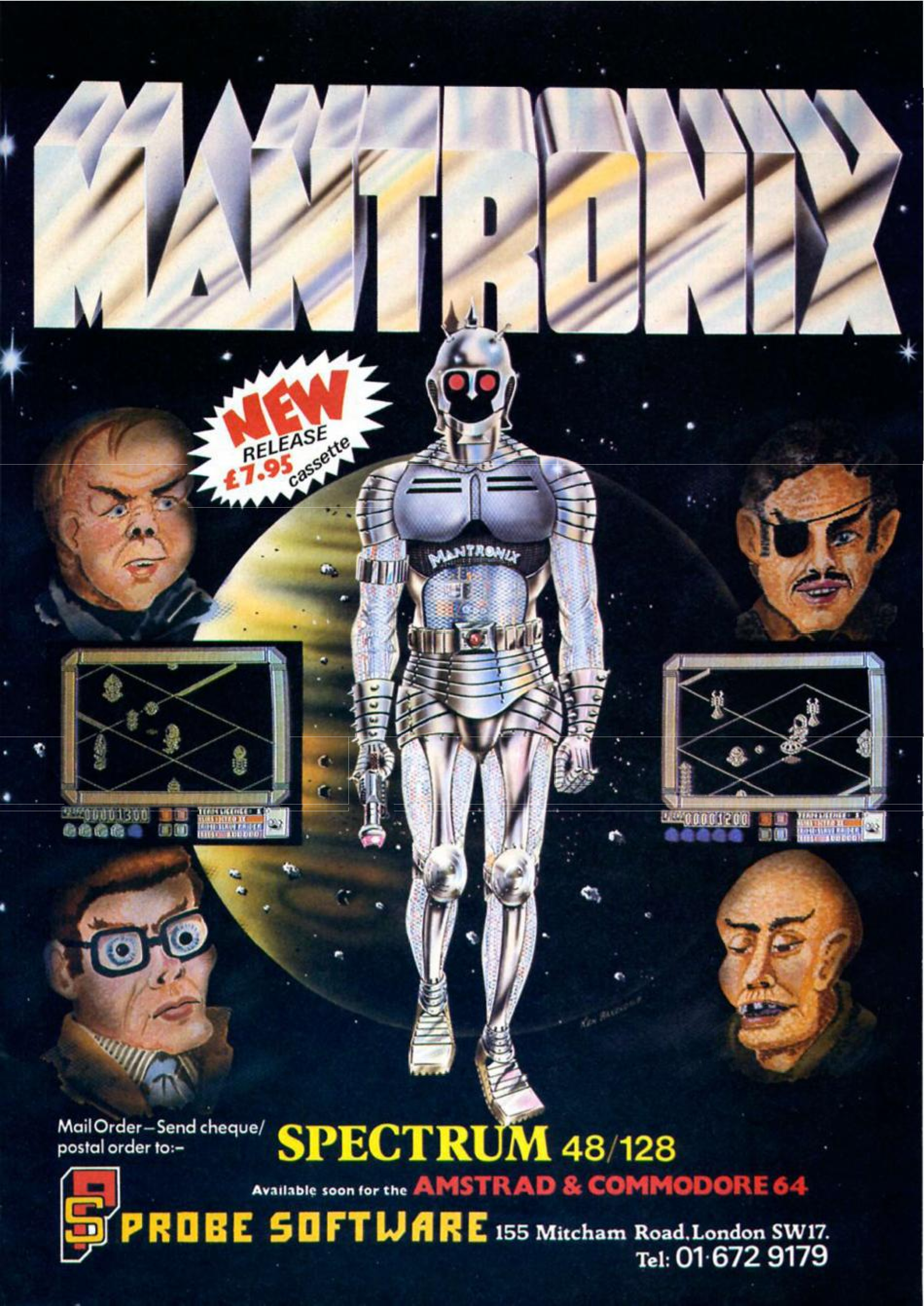
QL Future

Now for the bad news. The QL's future looks dismal at best. Negotiations with Amstrad over taking over the rights to Sir Clive's former quantum leap are continuing but some of those involved talk of nothing but frustration. According to one source, Amstrad wants some £2 million for the rights and is playing a delaying game and — at least for the moment — does not look like really wanting to reach an agreement that could effectively relaunch a competitor to the company's own range of lower-cost, business machines and home micros. A Dutch company is said to be interested but, as one QL peripheral maker put it, "I don't know how a foreign company is going to get Amstrad to talk seriously when we can't". Timex is apparently also interested and a group of UK companies involved in QL software/hardware is said to have raised about 40 per cent of the money they require to bid on the rights and market an up-graded QL with a built-in 3.5" disc drive, 512K memory and a full-blown 68000 microprocessor but realistically speaking, they look to be in an up-hill fight.

Sources say that Amstrad has sold up to 20,000 QLs (what's obviously the last of the stock that came with the Sinclair deal) for around £65 a piece in one big package deal. One UK micro company had bid for a smaller lot but was apparently told that it "was the lot or nothing". The deal was for exporting QL stocks only but it seems that some of them are gradually finding their way back into the UK so there may be a lot of bargain buys popping up over the next few months. To a point, the current mood of prevailing gloom is just a reaction to the early optimism over a "QL Ltd" group of companies taking over the rights almost as a God-given right. If Amstrad is playing its cards close to its chest and engaging in some cunning negotiation, it's really only big business in its most pristine form. After all, it's Amstrad's success in the market place that enabled it to buy out Sinclair at a bargain basement price in the first place and it's not likely to change a winning game plan as a favour to an enthusiastic but small band of QL supporters.

The other day, I had some heavy duty maths to do involving such exotic goodies as matrice multiplication and inversion. As these were never by favourite passtimes in school, I had a look at the **APL** package for my QL. Marketed by Micro-APL (£99.95), it's one of the earliest pieces of QL software to appear and one of the best. There is a calculator mode which means you don't even have to program in APL if you don't want to and I was able to set-up, multiply, invert and otherwise play around with large matrices without any fuss at all. This served to remind me what a good package the QL actually is considering all the quality software that's now available. We are all familiar with the various legitimate criticisms that came up in the QL's early days and have haunted its footsteps ever since but all too often we allowed them to unnecessarily overshadow its many good points.

I hope this doesn't sound too much like a QL obituary because it's still a bit early for that but, were it a rich maiden aunt, the relatives would be starting to look more than casually at a few expensive holiday brochures. The QL may not be at death's door but it is in the corridors thereof and no amount of optimistic talk about consortiums and relaunches is going to change that. At the end of the day, Amstrad will make a commercial decision, which I for one hope enables the QL to grow and prosper, but we are just going to have to wait and see for a while yet to see if it has a future at all.


MANTRONIX
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SPECTRUM 48/128
Available soon for the AMSTRAD & COMMODORE 64
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At long last Ultimate have finished Pentagram. Was it worth the wait?

For a long time now we've all been waiting for Ultimate to come up with a megagame that would have all our minds as totally boggled as Knightlore did when it first appeared. Since then many other software houses have leapt on the 3-D bandwagon and the novelty of that style of graphics has worn off. What's more, Ultimate themselves have tarnished their reputation somewhat with a number of distinctly non-mega releases (mainly for the Commodore 64), but through it all we've sat patiently waiting for Pentagram, the latest in the Sabreman series and the direct sequel to Knightlore.

The trouble with reviewing this game lay in the conflicting expectations that had been built up. On one hand we all expect a lot from Ultimate because of their past reputation, whilst on the other there's the memory of those recent disappointments, so it's quite tricky to forget all that and just judge the game on its own merits.

As usual the introduction and instructions on the cassette inlay are obscure to the point of irrelevance. There's nothing wrong with the instructions being vague, since that's always added an extra twist as you attempt to unravel all the intricacies of the games, but I can't help thinking that since US Gold took over the marketing of Ultimate's games the cassette blurbs have become just so much badly written waffle. There are references to stars and runes and stone shapes, but the grammar's so awful it's unclear what it's all about.

Starting to play the game reveals that there are slightly fewer control options than in past games. Instead of the directional control that allowed you to move Sabreman in the direction that you move the joystick, there's now just the rotate option: this means that moving the joystick left/right rotates Sabreman anti-clockwise or clockwise and pushing the stick forwards then makes him walk in whatever direction he's facing. Jumping is performed by pulling the joystick backwards. I found this a more difficult way of controlling Sabreman's movement and got myself killed off a fair number of times as a result, though to be fair this game requires less of the precision timing and movement that Knightlore and Alien 8 required. In addition there are controls for firing magic missiles and pick up/drop.

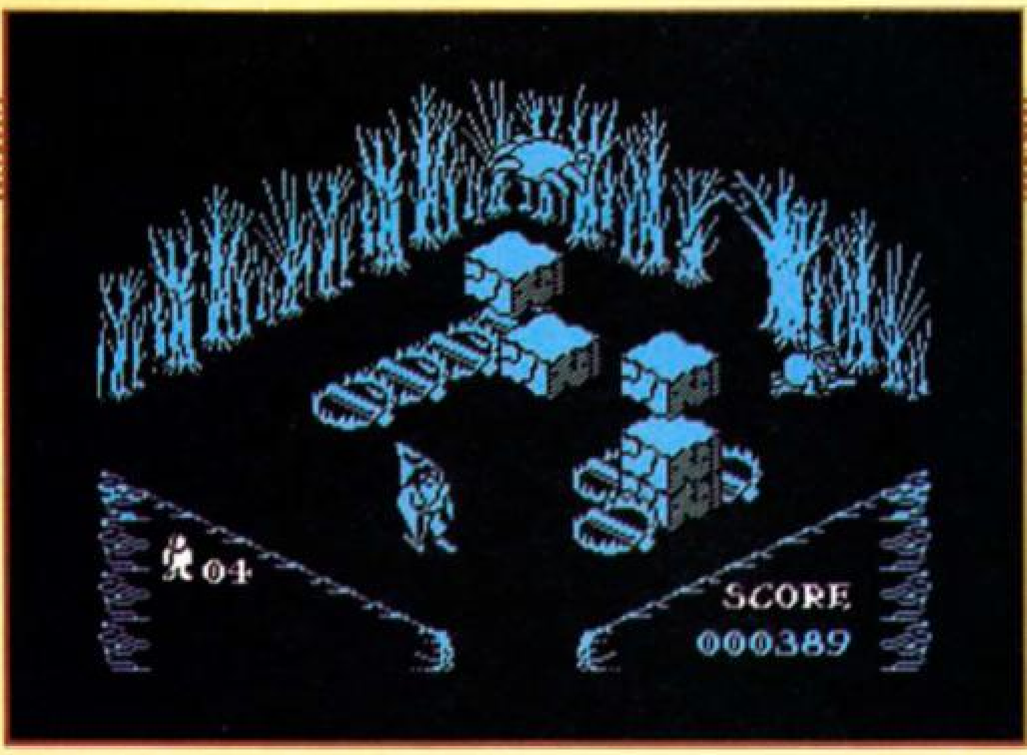
The Sabreman's latest adventure sends him searching for the Pentagram of the title. The Grand Arch Wizardry spell book tells of 'silvery waters' drawn from ancient wells, runes and stars, and of the Pentagram taking on solid form once more. Thankfully Pentagram is a return to the Knightlore format, rather than the style of Nightshade and Gunfright. The graphics are in the now familiar Knightlore style — a view of each location from a point that is just above head height, though not directly overhead. Locations are drawn in just one colour to avoid attribute problems.

The Sabreman, now kitted out in a pointy hat and wizard's robe, is wandering around a forest landscape, dotted here and there with lily ponds and snare traps (fatal of course) and some castle ruins with all the usual spiky blocks, crumbling walkways and moving stairs. I always found the complex sets of obstacles the most enjoyable part of playing Knightlore and missed that element in Gunfright and Nightshade, so I was glad to see that they were all back in Pentagram, though there is slightly more emphasis on monster zapping in this game than in Knightlore.

Apart from these obstacles most locations are empty when

Pentagram
Ultimate/US Gold
£9.95







you first enter them, but after just a few seconds all sorts of ghosts and ghoulies start to appear and chase after you. There are witches on broomsticks, zombies, ghosts, giant spiders and what appear to be giant pear-drops which bounce around after you. None of these are instantly fatal but repeated contact with them takes its toll and eventually leads to your going up in a puff of smoke. They don't move terribly quickly so it's not too hard to get lined up and zap a magic missile at them, but the longer you hang around the more of them will appear. This does have drawbacks, because on some of the busier screens where there might be both monsters and moving blocks as well as the Sabreman himself, the movement of everything on screen does slow down a lot. It might have been a good idea to make sure that locations didn't get overcrowded, though this doesn't happen so often that it's a major flaw.

The runes are large stone tablets each with a distinctive mark carved on it, and of course they're all placed in the most inaccessible locations and surrounded by traps. The same applies to the wells tucked away in various corners of the forest.

There are a number of small stone pyramids in the forest and I think that they've got something to do with the Pentagram itself, though I haven't yet managed to work out exactly what. I've tried jumping on them, zapping them, pushing them over — all to no avail, so I suppose that I'm just going to have to make the ultimate sacrifice (no pun intended) and go back to playing the game until I've solved it all. It's not easy being a games reviewer...

MONSTER HIT

PLANETS





Eric Doyle goes planet-hopping with Martech's latest release.

Strategy, puzzles, codewords, laser blasting and prizes. Martech's new game seems to have everything. The keyword to describe it is enigmatic.

Set only 40 years in the future, Earth is a dying planet facing the onset of a second Ice Age. All seems lost until the discovery of a strange alien capsule in Switzerland.

This is where you come in. In the guise of a space explorer on a routine mission around the solar system you are called back to investigate the capsule which has a combination lock. The only clue you are given is that you think the word 'LIFE' is the key. This is a pretty heavy clue as you will soon find when you encounter the capsule, but first you must descend to Earth.

The surface lander is simple to guide but difficult to control. Part of the descent is controlled by the mothership's tractor beam but at 10,000 metres steering becomes a manual operation. This means controlling your descent to land as near to the capsule as possible with a velocity of less than 20 metres per sec. With gravity to fight against this is no mean feat as your fuel dissipates at a frightening rate and you must preserve enough to rejoin your mothership later. Successful pilots are rewarded with an attractive view of the Swiss countryside and then it's icon time.

Messages are displayed across the top of the large, central screen with the bottom panel being reserved for instrument panel readouts. Three icons are arrayed down each side of the screen and some of them open up further icon menus, called sub-icons.

Selecting the EXPLORE icon allows access to the lander and its robotic surface explorer. As we have seen the lander is the shuttle between the mothership and the planet surface. The robot is used to locate and examine the capsule. When a capsule is found the MANIPULATE icon allows you to try various codes in your attempt to break into it. The first capsule has a long range map unit inside which is essential if your mission is to continue.

The next challenge is to rendezvous with the tractor beam. Once again fuel and speed are critical if you are ever to see your mothership again. On returning you are liable to find that an alien transmission has deposited a strange game into your computer's memory bank. This is a game within a game and truly deserves its name: WEIRD! Part of the mission is to unlock its secrets after loading it from side two of the twin cassette package.

Let's not worry too much about this just yet. Time is short so we go back to the icon menu. Selecting the MAP icon displays our solar system and a destination can be chosen using a cross hair cursor. If you want to know something about the planet first the DATABASE icon could prove useful. On the other hand, if you can't guess the log-on code you'll be denied access to all the secrets of the planets. After trying several words I hit on one which briefly has a lot to do with Martian technology. Using the HELP facility then listed the database's functions.

The information contained within the database gives the vital statistics of all the planets and space phenomena which you're liable to meet on your odyssey. This is very educational because it includes the information provided by Voyager 2's encounter with Uranus. All of the planet data has been supplied by Heather Couper who, as President of the British Astronomical Association, ought to know what she's talking about.

Logging off from the database allows access to the TRAVEL option which tells you to load your destination's vital statistics from the second tape in the package and you're off on your adventure.

Orbiting around the planet you can use your DATA icon to test the gravitational pull of the planet so you can get some idea of the amount of fuel required to effect a safe descent. From now on, you're on your own. The full purpose of the game is not revealed until you have located and opened all of the capsules and a prize awaits the first person to complete the game. For those who like plenty of challenges in a game this comes highly recommended for its physical and mental challenges as well as its superb graphics.



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Biggles comes unstuck in time in the latest barnstormer from Mirrorsoft.

Biggles
Mirrorsoft
£9.95

Biggles in the Air, Biggles in London, Biggles on the Battlefield, Biggles all over the place. In the film, Biggles gets caught up in a timewarp that sends him flying backwards and forwards across time as he attempts to find and destroy the secret Sound Weapon with the aid of Jim, his 'time twin' from 1986.

The computer game takes the same plot and uses the timewarp device to construct a four part game based on the different times and locations that Biggles finds himself in during the course of the film.

Side one of the game tape contains the Timewarp game. This is made up of three related sequences (Air, London, and Battlefield, as above). The sequences have to be completed in the correct order, which is made a little bit tricky because of the timewarp that can snatch him out of one sequence at any moment and drop him into another one, so you'll have to plan carefully to make sure that you get them finished in the right order.

In the first, Biggles in the Air, you control Biggles' biplane as he flies over enemy lines trying to find and photograph their secret weapon. On the ground below there are anti-aircraft guns that are trying to blast you out of the sky, and weapon dumps that can supply you with bombs. Up in the air with you are enemy aircraft ready to shoot you down unless you can duck and dive past them or shoot them down yourself. Your plane moves up/down, back and forth over a scrolling landscape, and you need to react quickly to avoid the enemy firepower. Like all the parts of the Timewarp game this is a simple game, but one which is enjoyable, and tricky enough to offer a challenge.

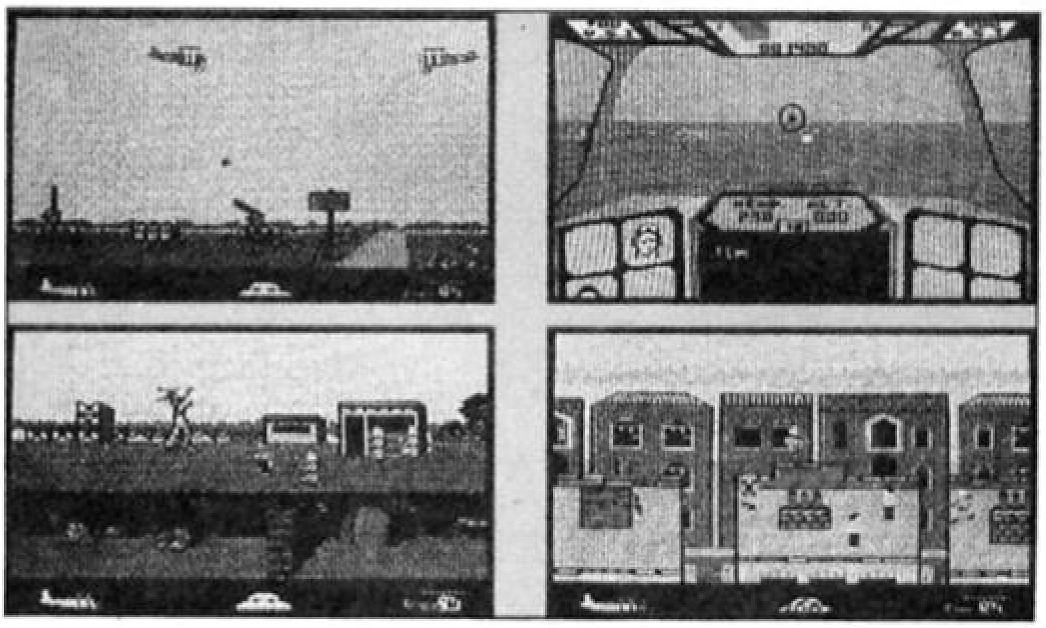
The Battlefield section is a bit like a cutdown version of Imagine's Green Beret. You control Biggles as he runs across a battlefield, dodging and shooting his way past enemy soldiers as he tries to reach the weapon's test site. Though this part of the game lacks the detailed graphics of Green Beret, I actually found this version more playable. It's not quite as fast as the Imagine version, and there are fewer soldiers pouring onto the screen and whereas I never managed to last more than a few seconds in Green Beret, in this game I felt that I had a fighting chance of getting through if I could just go back and have a few more tries.

In the London sequence, Biggles and Jim have to leap across the rooftops to reach the timewarp and get back to 1917. You control the figures of both characters, and as well as getting them to jump the gaps between buildings have also got to get them past the rooftop patrols and snipers who are situated in other buildings taking potshots at the two daring chums. Again, it's a simple game but still playable enough to keep you working at it.

Side two of the tape is the final adventure in which you fly Biggles over enemy lines in a hi-tech helicopter as you set out to finally destroy the Sound Weapon. Along the way you can pick up equipment and some of Biggles' pals, including Marie the resistance fighter who can help you locate the test site.

This game is a sort of cross between a flight simulator and wargame. As you pilot the helicopter over the enemy ground your cockpit controls offer two map displays showing the locations held by the enemy and those that are being held (singlehandedly of course) by some of Biggles' chums.

I normally find flight simulations a bit boring — all that watching of dials, worrying about altitude, airspeed, and tying fifteen fingers in knots just never seems like much fun — but the programmers have kept things simple here, and put the



emphasis on playability and dropping bombs on the enemy, which is more my kind of thing.

Games based on films and TV series have, deservedly on the whole, gotten a lot of bad reviews and I wasn't expecting all that much from this one, but Mirrorsoft have come up with one of the better tie-in games. Biggles comes through again!



COMPETITION

Chocks away chums! Biggles has landed, and here's your chance to win a sackful of Biggles' goodies. Competition





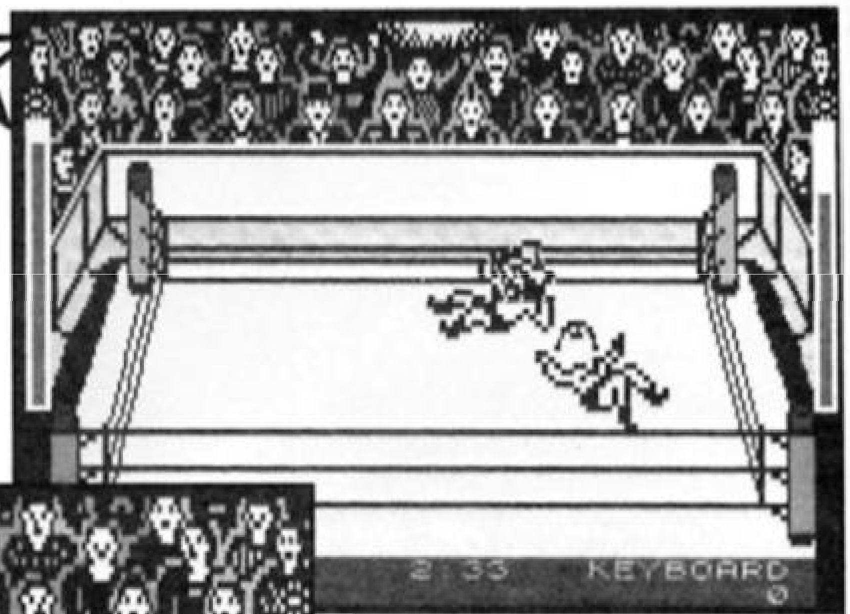
To celebrate Biggles' arrival on your computer screens, ZX has got together with Biggles' chums over at Mirrorsoft to put together this spiffing competition.

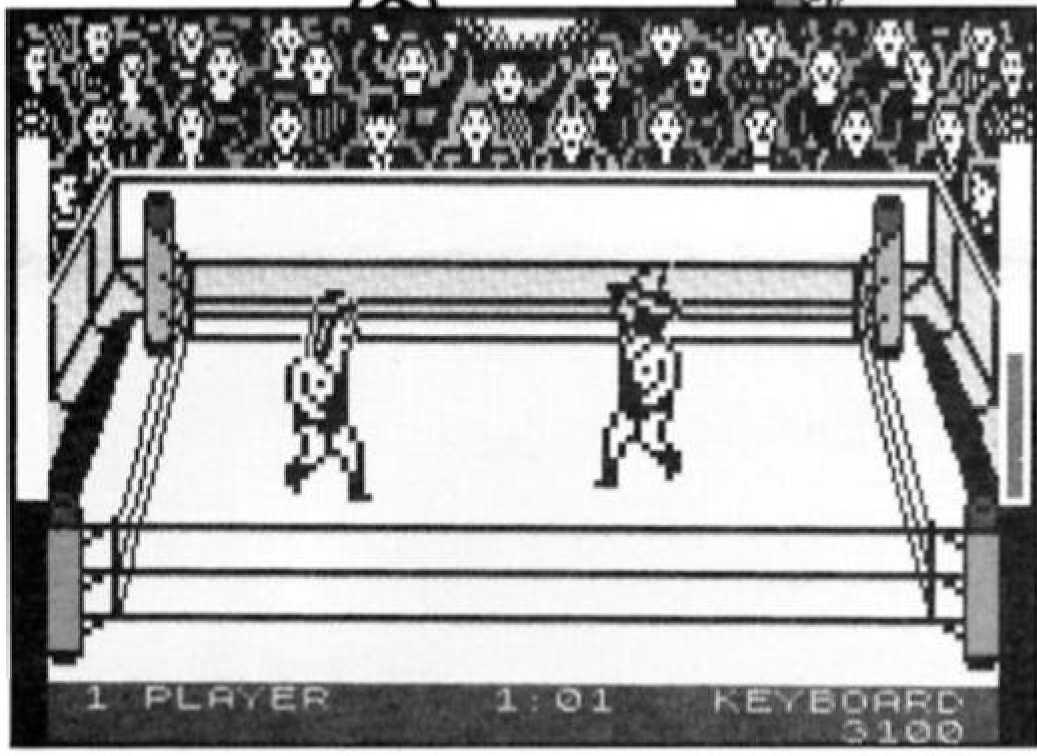
The first prize will be a Biggles Goodies Bag containing a copy of the game, Biggles T-shirt, scarf, book, soundtrack album, badge and poster. And for 25 runners up there will be prizes of the game, T-shirt and badge.

To enter the competition, all you have to do is take a look at the still we've taken from the film (Biggles in a tight spot), and think up a caption to go along with it. Write your caption, along with your full name and address on the back of an envelope or post card and then send it off to Biggles Competition, ZX Computing Monthly, 1 Golden Square, London W1R 3AB.

Entries must arrive by first post on the 8th August 1986. The competition is open to all readers of ZX Computing Monthly, except employees of Argus Specialist Publications, Alabaster Passmore and Sons, and Mirrorsoft. The winners will be announced in a future issue, and the Editor's decision, chums, is final.

ROCK'N WRESTLE





All this violence and not a Ninja in sight — Melbourne House are set to pummel you into submission with this grappling package.

Rock 'n' Wrestle
Melbourne House
£7.95

Melbourne House with Way of the Exploding Fist and Fighting Warrior have been the trendsetters for combat games and Rock 'n' Wrestle is yet another simulation that seems destined to enhance their reputation.

There are no mystical depths to plumb, no other aim except annihilating all opposition with a bewildering variety of wrestling moves. You play Gorgeous George the tenth ranked contender for the world title who must head butt, forearm smash and drop kick his way to the top.

As with Melbourne House's previous combat games the different moves and combinations of moves are initially very tricky to master and playing in a two player mode against a stationary opponent is very necessary to sharpen up your repertoir of devastating blows.

There is a keyboard option for both one player and two player mode but this could cause fingers to become severaly knotted during a difficult bout.

Altogether there are 25 separate moves and holds. Moving around the ring simply requires joystick control. A single trigger press will give you some softening up options such as a sharp lift of the knee, forearm smash and kick. But it is the grab (pushing the joystick forward and pressing the fire button) that will lead you on to the more spectacular (and satisfying) moves.

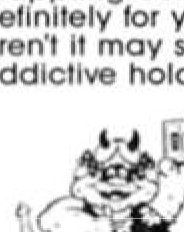
Once you've grabbed your opponent one option is to spin him around the ring and throw him onto the ropes. On the rebound pressing the fire button and moving the joystick will produce a nice range of flatteners such as the body check, drop kick and flying body press.

If you grab your opponent from the front it gives you the chance to inflict a head butt or a lift which again gives you a choice of masochistic options — a body slam or pile driver with an aeroplane spin for starters if required.

Grabbing your opponent from behind opens up the possibility of a backbreaker or 'Atomic drop' (dropping your opponent feet first onto the canvas). When you get some of these moves working smoothly Rock 'n' Wrestle is a joy to play and the complexity of moves you can make gives the game plenty of mileage. Due to the number of movements included the graphics do seem to be under strain and realism of the wrestlers seems to have been sacrificed in order to cram in as many moves as possible. On balance this was probably the right decision as having well depicted wrestlers with fewer moves would not have made a better game and in the end there are few if any of the well known wrestling holds omitted.

There are no knockouts, two pin falls are needed to secure victory and when you are playing against the computer you could well find yourself pinned before you've made a move. Trying to escape a hold depends on your strength level but you are not entirely helpless and furiously jiggling the joystick can force your opponent to break the hold.

Overall the furious action of Rock 'n' Wrestle more than makes up for less than startling graphics and almost non existent sound and if you are bored with martial arts games it makes a good alternative for venting aggression. If you are a grappling connoisseur it's definitely for you and even if you aren't it may still exert an addictive hold over you.

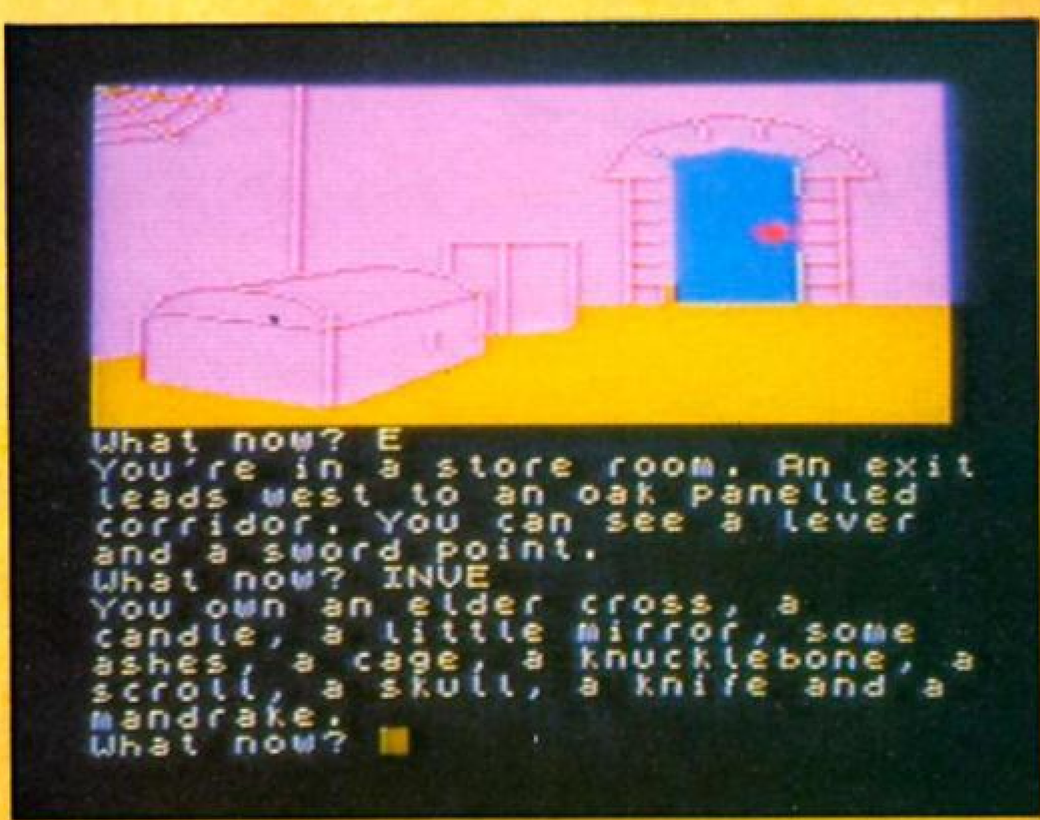


GREAT


·B·B·B·BOUND TO BE A HIT··
"10 levels of fun make this torture excellent value for money. Nova rating. Definitely one of those 'just another go' games. Game of the month February" – Computer Gamer
"The most compulsive game I've ever played. If you don't buy it you'll never know what you've missed." says Gary Penn, Zzap! 64. Gold Medal Award. 97% overall.
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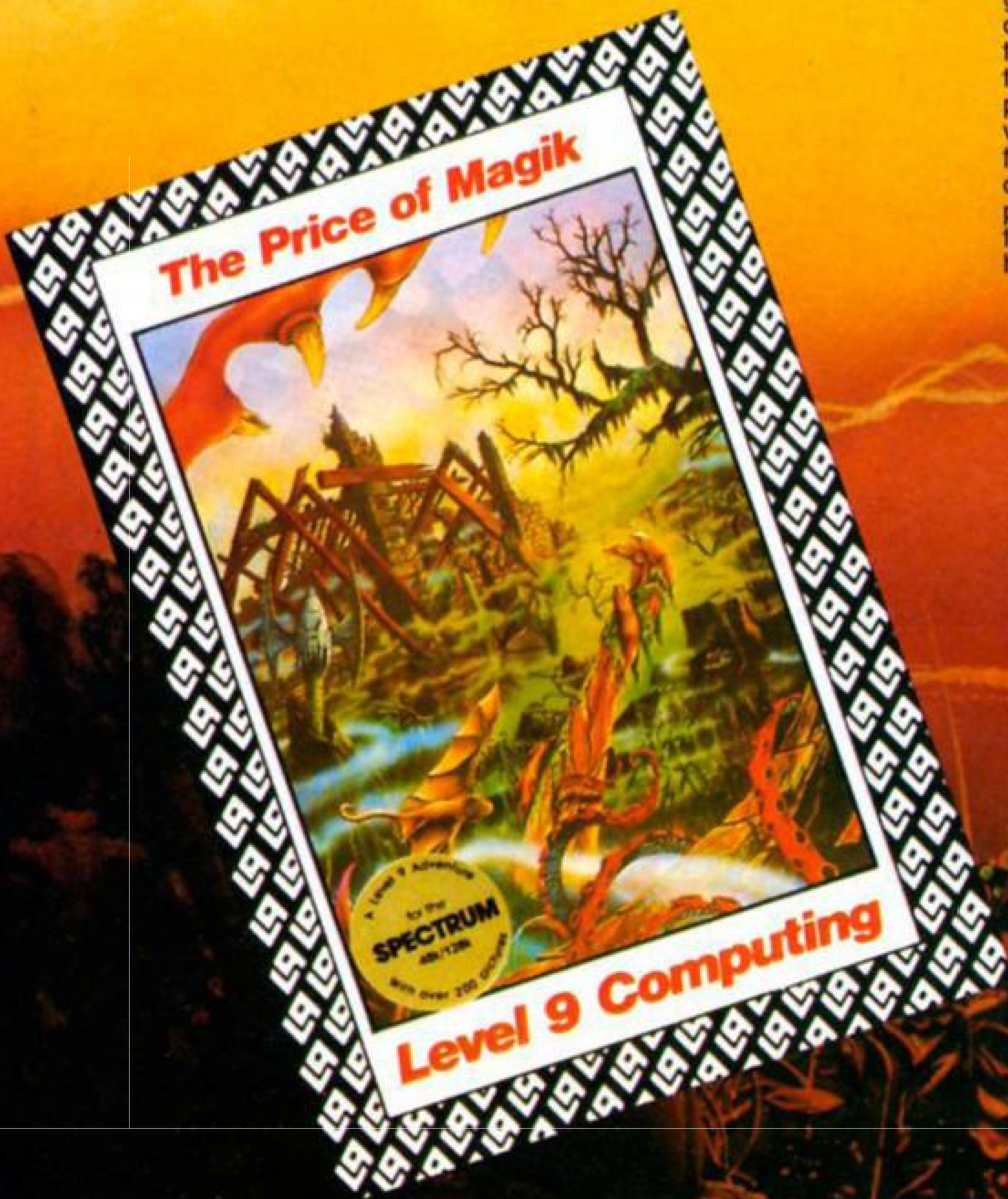
The Price of Magik
Level 9 Computing
£9.95

THE PRICE



Magic used to be plentiful. That was when the moon shone red and radiated its power over all the earth. Gradually however, the amount of magic present began to wane as the sun bleached the moon's power away. Things became so desperate that the magicians decided to create a red moon crystal of Baskalos whilst some magic still remained. That they were successful is now well known and the story of their achievement was written down in the annals of history. People still clamour for the story of Red Moon. But time passes and prosperity has returned to the land.

When the crystal was created, the best of the remaining magicians were appointed as guardians. Under their care, the red moon crystal slowly gained in power and magic spread throughout the land again. Myglar was one of these guardians and he too looked after the crystal carefully. But as the years passed, so Myglar took to thinking and the subject that preyed on his mind most of all was that of his own mortality. The thought of dying terrified him and so he began to divert the power of the crystal away from the land and use it for himself in his search for immortality. The

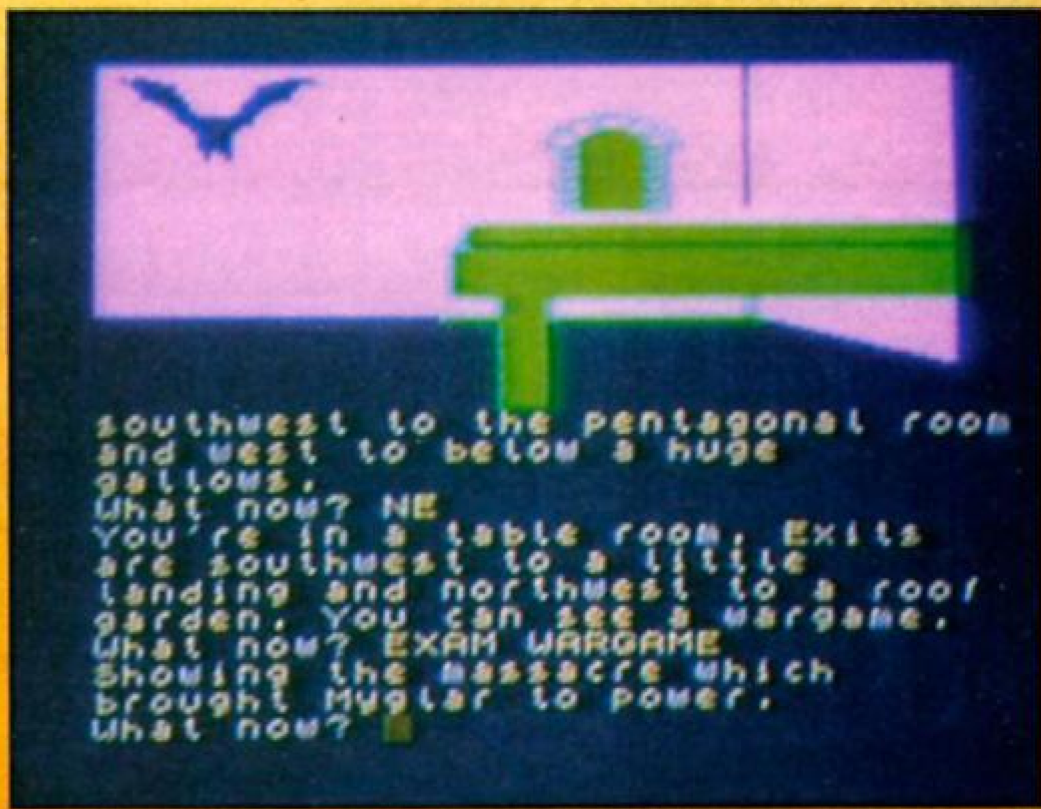


OF MAGIK

Enter Level 9's latest venture into the magic kingdom.

power of the red moon is now quickly diminishing again. The only way to stop it from disappearing altogether is to defeat Myglar and take his place as guardian. And that is why you are standing, somewhat nervously, outside the House of the Red Moon.

The Price of Magik is the latest release from Level 9, Britain's premier adventure producers. Such was the response to Red Moon (it won several awards), that adventurers everywhere have been awaiting this release with considerable anticipation, especially as the Brothers Austin claim that they have improved their data compression techniques even further and crammed even more into the game. There are over 200 locations to be explored, all of them illustrated together with about 150 objects and creatures to be discovered and manipulated. The program boasts a vocabulary of over 1000 words so that you shouldn't have too much trouble in finding the mot juste.



Under the spell

Magic does not come easily to you — in fact you start off knowing exactly nothing. Very reassuringly, the instructions



GAME REVIEW

THE PRICE OF MAGIK

inform you that in order to succeed in your quest, you must know everything. This involves you learning some eighteen spells before you can seek a final confrontation with Myglar. In order to cast a spell, you must first of all know its name (no great surprise here) but you must also possess that particular spell's focus. This is an object from which the spell draws its power. In general, the object is connected to the spell so that there is not too much guesswork involved. For example, there is a spell that heals any wounds that you may have incurred in combat and the focus required is a herb. There are hazards involved in using magic though.

Every time you cast a spell, you age magically by a year. This in itself is not too serious, but it does have rather disastrous consequences if you reach the age of one hundred. Don't despair too much though, there is a way of magically reversing this ageing process. The acquisition of magical ability is connected with a loss of sanity. You start off perfectly sane but as you progress through the game and learn more about magic, your sanity decreases. This is used as a method of scoring — there are no points to be gained for finding treasures or defeating monsters.

The creatures found in the game are many and varied ranging from bats to werewolves, slugs to ferrymen. Some you will need to fight, some are best left alone and others are needed to help you although they may not do this willingly. Combat is initiated by typing "kill mummy" or whatever. The program assumes that you are using your best weapon from any that you might be carrying. Each party has a certain number of hit points and a successful hit reduces this value. When the total reaches zero, the creature (or you if you are unlucky) dies. A word of warning here. You are likely to have to fight a creature several times over as they keep coming back as ghosts to haunt you!

Mapping the game is very straightforward, not least because all the location descriptions tell you where the exits lead to. The only problems that I encountered were negotiating the different floors of the house and finding room to draw in the secret doors. Strange isn't it how the piece of paper that you use for mapping is always the wrong shape and the passages soon take you straight off the edge of the paper with acres of open space in the other directions! A nice feature of the game is that it is very easy to get into. You are not stuck in the same few locations until you solve a specific problem. After a couple of hours playing, I had well over 120 different places mapped on assorted bits of paper. That was about all that I had done at that stage as the game itself is fairly difficult. I kept coming across situations where I knew what I wanted to try but didn't have the appropriate spell. What an excellent way of making sure that you play the game again and again.

Four letter words

The vocabulary is very large at over 1000 words and the parser is on the whole excellent but there are one or two little problems. Most of the time, the program only looks at the first four letters of a word but there are occasions where you need to type out your word in full. For example, you start off outside the front door of a large house. On the door is a large knocker in the shape of a griffin. If you type "exam knock" (which you need to do), the parser assumes that you are trying to knock on the door (in other words it is using "knock" as a verb rather than a noun which is what you intended). This is rather unfortunate as knocking on the door is not exactly beneficial to you as it summons a monster.

The other problem with the parser comes if you use a word which is not in the game's vocabulary. Sometimes your "wrong" word is sufficiently similar to another one in the game and you get a message to the effect that you can't see a XXXX here which spoils things slightly if you haven't come across the XXXX yet.

Adventurers are split down the middle when it comes to arguments as to whether or not a game should have graphics. Fear not! Whatever your tastes, the Price of Magic caters for them with two versions of the game on opposite sides of the tape. Take your pick from a text only version with expanded descriptions or choose to have every location illustrated. The pictures are fairly simple but are bright and colourful and have the advantage of being drawn very quickly if you are moving rapidly around previous explored areas. This is due to the multi-tasking system used. There are not really any extra clues to be derived from the pictures although some of the objects illustrated do play a part in the game's later stages. Personally though, I much prefer the extra atmosphere created by the text version.

Back tracking

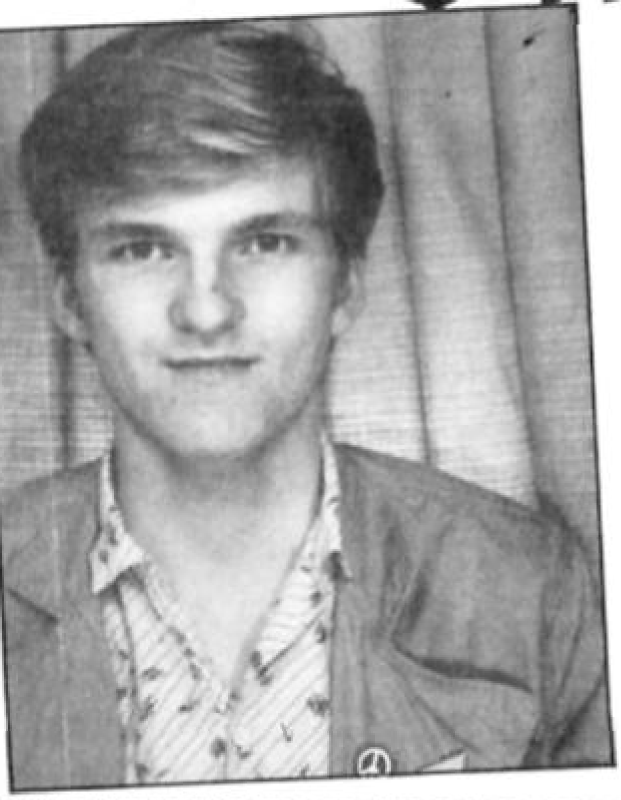
There are several ways to save your position for a later date. Ramsave stores your current details in memory for as long as the computer is switched on. For a more permanent record, there is the usual save to tape facility although you will have to use the dreaded Lenslok system when you want to restore a game. Incidentally, it is the up and down cursor keys that are used to adjust the large letter "H", not the left and right keys as indicated on the screen. One very useful feature that I had not come across before was the "OOPS" command. This, as its name suggests is for when you have typed your instructions and the outcome of the action has shown that your judgement was somewhat lacking (I got my head cleaved in when an axe fell on it!). Using "OOPS" allows you to go back a move and so try something different. For those of you with 128s, this facility can be used some sixty times consecutively but I can't believe that any ZX Computer reader would be stupid enough to type in sixty silly commands!

There is a lot to this game and it is one that will keep you going back to it as you attempt to crack it. As with all Level 9's games, all serious adventurers will want it in their collection. At only £9.95 to become a sorceror, the Price of Magik has got to be good value for money.



It's five o'clock in the morning and you have just finished writing the most addictive game the world has ever known. What's your next step? Steve Gretz follows the path to becoming a professional software author.

Breaking In



Robin Thompson, whose game Molecule Man arrived in Mastertronic's post one day and was snapped up.

In the games software industry there is a continual and relentless hunt for what is called in the esoteric hi-tech jargon of the trade — the BTSSB factor.

For the layman this unfathomable abbreviation actually stands for the Best Thing Since Sliced Bread, and when a software house lays hands on this rare commodity they are unlikely to let it slip through their fingers.

Rule one in the software jungle is that companies will not pass up a potential mega-game if it lands in their laps and an adage worth remembering if your confidence falters is that "if you've got what it takes they'll take what you've got."

Unfortunately rule one is seldom observed as BTSSB games don't surface that often. BTSSB games can be presented to software houses wrapped up in old newspaper but there is a chance that while your game might not measure up to the legendary Sliced Bread it could be marketable, and there are certain ground rules that could improve its chances of success.

Which software house?

Some software houses tend to specialise in licensing deals, conversions from one machine to another or, as in the case of Elite, conversions from coin-op games to home micros. These companies, although they would not object to a BTSSB game coming up and slapping them in the face, are more on the look-out for expert programmers with proven skill in specialised areas who can work as part of an in-house team or as a freelancer.

Elite's Steve Wilcox told us, "We are fairly heavily involved in coin-op conversions and the sort of person we are looking for has already been involved in commercial games programming. We are ideally looking for people to produce graphics and music.

"If you happen to be a specialist in 3-D graphics there is an industry-wide shortage of programmers in that area.

"We have difficulty in finding programmers who can handle the mathematical aspects of 3-D: Most programmers are self-taught, without that sort of expertise, and although there is a lot of demand for 3-D style games we can't get the right people."

The need for experience when working on team developments was echoed by Keith Robinson of Odin (Nodes of Yesod, Robin of the Wood): "The main thing we look for is whether people have been in the business before. You can't afford to take chances on unproven programmers."

Versatility counts if you want to get into team programming.

"One problem we have is that some good programmers only want to work freelance or on one machine, whereas they have an obvious advantage if they can work with a variety of machines and processors."

Odin, like every other software house is constantly receiving games from hopeful amateurs and commented: "We tend not to publish programs we get because the vast majority are simply not up to standard, although we do get the occasional good game in. Our advice to those we don't accept is to keep plugging away at it."

While a submitted game might not have the makings of a hit there may be features in it that catch the eye of a software house. "The most important things are graphics and animation. If you can do that you can do anything in the games industry."

So while your cherished game may never reach the shelves your talent in a particular area could be useful in the team development of games, and although the "you have to have experience to gain experience" catch may seem a real hurdle it is not insurmountable if you have the skills that are in demand.

But, if you are adamant in your quest to get your game published it is advisable to aim for software houses who specialise in developing their own software. And if you thought that budget software houses are a soft option think again. While it may be encouraging to think "I could do that" when playing a so-so budget game it is worth remembering that the standard is constantly being pushed up through competition, and writing a game of a comparable standard may not be enough to impress. Alison Beasley at Mastertronic said, "Only about two per cent of games sent in are of a good standard and only a fraction make it into production. There are exceptions, such as Robin Thompson who wrote 'Molecule Man', it was his first game and just arrived in the post one day."

Presentation

A potentially good game can be let down purely on the quality of its presentation.

"The best thing from our point

of view is to receive a finished game that is real quality work," said Philip Morris of English Software. "You would be surprised how often we are sent tapes that won't load or are without proper loading instructions."

Andrew Hewson outlines what Hewson look for in evaluating a program's potential.

"You can look at a program and with experience quickly develop an opinion. There are some very basic guidelines — have they used all the screen area? Are there blank spaces? Do they have a good eye for colour and avoid clashes? Is the program running at a sufficient speed? Is the action smooth? Are the graphics flickering?"

Another important aspect is the appeal of the game subject. "You may get a very good program about running the bus service on the Isle of Wight but the arcade appeal would be strictly limited."

On the other hand, a brilliant idea for a game isn't enough. "Ideas are ten a penny," said Andrew. "And an idea isn't enough. What we have to be sure of is that the potential is there to take an idea through to the finished product.

"When someone approaches a software house they must have something in their hand that's impressive. We don't necessarily need a finished product but there has to be something there that implies the finished product will be good.

"In fact, as far as we are concerned we don't necessarily want a finished product as there is always room for improvement and we like to build as much into a game as we can. But the fact that a game may need changes shouldn't be discouraging as that can apply to even the most experienced programmers."

Practical tips

One company that has been actively seeking new programmers and games through advertisements is Superior Software (Repton). In conjunction with their recruitment drive they have produced a booklet called Top Tips for Games Authors which contains a wealth of good advice on how to write marketable software.

Ken Cambell of Superior Software said, "It's really an exercise in creating interest and passing on hints on how to convert ideas into a game."

For those about to sit down and write that elusive BTSSB game here are a few sample quotes from Top Tips.

Coding

"Use a good assembler or software development kit. Document your source code well so that changes can easily be made."

Graphics

"Write or use user-friendly character and map designers to make life easier for yourself. Try to make the graphics as varied as possible by designing 'graphics primitives' — small building blocks which can be combined to create bigger blocks to produce the different screens.

"If you are not particularly artistic, get a friend to design the graphics for you. If your graphics are easy to use then your artist friend will be that much more productive."

Animation

"Use as many frames as possible to animate the different characters. Four frames is really a minimum for walking in one direction. Make a dying man crumple elegantly to the floor; make him bend over and pick something up rather than have the object suddenly materialise in his hand."

Sound

"Include sound on/off options. Many people find sound effects distracting, and some like to play games late at night (without disturbing the neighbours)."

Control

"Make the game as easy to operate as possible and avoid complex key operations: the best games require very few instructions for playing the game. Don't drop the player right in the action, ease him gently into the game so that he can get used to the controls. Not every player is an arcade ace — many are young children.

"Include both joystick and keyboard control — with user-selectable keys if possible. Some people do not have joysticks, whilst others may prefer to use the keyboard.

"Include a game pause, causing your main character to crouch, sit or tap his foot, or something completely out of the ordinary."

Finishing touches

"Include a suitable pause between each life lost and the game over message, so that the player knows what has hit him, so to speak. Allow the player to abort a game easily if he is doing badly, and don't make him wait 30 seconds before he can start again just because you have insisted on inserting a nifty animation routine at the start of every game."

High score table

"High score tables are a very important feature. Players want to see that they are improving. Keep the maximum number of entries to 20 with sample scores added which increase in such a way that the player can see his skill developing as he slowly but surely improves his ranking in the table.

"The top position should be attainable but fairly difficult to achieve. Allow at least eight characters for name input.

"During game play, you could display special messages for a score of 10,000, another at 20,000 and so on. Or you could add a graphical effect, a simple change of background colour at very high levels can be immensely stimulating and rewarding, especially as the player realises that he is seeing something that few people will ever see."

Game testing

"The only real way to do this is to get somebody else to play the game without your supervision and allow him to do daft things with the game. Ask people who do not know you well as they will be more blunt and honest about your game. You will be surprised how many bugs will be uncovered. Watch out for easier ways to solve your difficult puzzles. It may be possible to complete the game easily by finding trick ways through the game or by solving puzzles in a different way.

"Are the testers having fun? Do other people stop what they are doing and crowd round the display, or do they take a quick look then wander off? A good game should draw the crowds like the pied piper of Hamlyn. Note down any comments — don't rely on your memory — then retire to your computer and make improvements."

So, if you've got that surefire number one blockbuster bubbling at the back of your mind get cracking, but there may be someone ahead of you in the queue to the games hall of fame. You see I've got this idea for a game, it's an underwater karate simulation set on Mars in the middle ages and believe me it's going to be the best thing since. . .

The Young Ones
Orpheus
£7.95

The Young Ones are out to create havoc in this crying, talking, sleeping, walking, living game.

The scene is a dirty hovel somewhere in Britain. A cool person is transfixed by a flickering TV screen.

'Hey Rik, look at this we're on the telly!'

'Oh great! How decadently bourgeoise Neil!'

'What? Is there someone at the door? Oh no! That's me and there's someone else in my body. That's too heavy for me, I'm going to meditate a complaint to my spirit guide.'

'Oh go away, you soppy hippy. Mike, where's Vivian?'

'He's upstairs reading up on a few old saws.'

'You mean fascist things like a penny saved is a penny earned?'

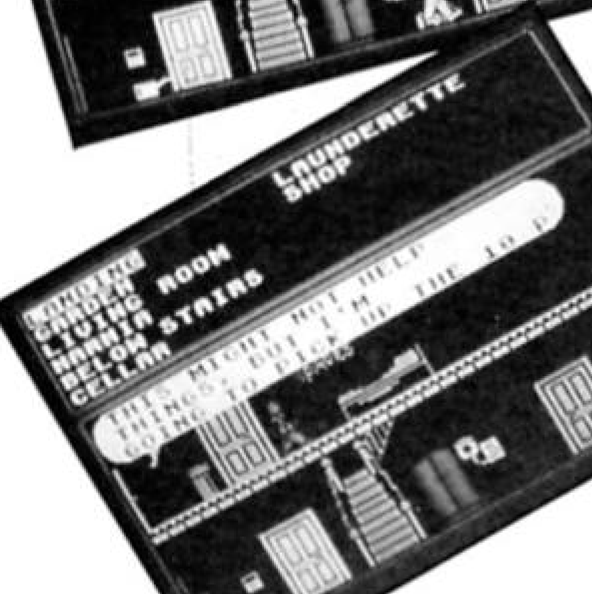
'No. I mean hacksaws, buzz saws, chain saws. . .'

'Vivian! We're on the telly!'

'Well get off you'll break it! That's my job.'

CRRRAAASHSH!





It's a pity Viv is so violent, if he'd waited a few moments he'd have been able to play Orpheus' latest offering 'The Young Ones'. You've seen the programme, been sick on the record and now you can play the game.

The lads have decided to move out of their house and you can join in the chaos by becoming one of them.

At the start of the game you choose your character from the four who appear on the screen. Rik is the people's poet, a wet sociologist. Mike is the cool person and womaniser. Neil is a hippy, vegetarian and pacifist. Vivian is a punk, violent and totally irresponsible.

The personality of the character affects the way you have to play the game. For example, Neil is a dreamer and moves more slowly than the others but Viv tends to whizz around. Whoever you play, the idea is to collect all of the things which relate to your Young One's personality. The objects are scattered about the house in an anarchic manner which would appeal to Rik's political leanings. Some of the objects are fairly mundane but others are definitely weird. Amongst the kettles, video recorders and guitar cases are chain saws, bogies and dead rats.

Each person can only carry a few things at a time until he finds a suitable receptacle to put them in. For Viv this would be a black bin bag and for Neil a guitar case.

The first person to collect all of his belongings wins the game. This would be easy except for the fact that any of their chattels can be hidden in beds, the fridge, the cassette recorder or any other openable object. Certain objects rely on the possession of others before they can be picked up. The grave cannot be opened without the spade, for instance.

Inside the wardrobe in the hall is the entrance to Narnia but, unless you possess the correct item, access to this make-believe world is impossible. Other locations outside the house include the laundrette and the shop.

Control of your character is via a menu at the top right of the screen. Usually three options are available: action, talk and walk.

Action allows you to do something with one of the objects. This may simply involve picking it up or could give other possibilities like switching it on or opening it up. All of the objects in the room or carried by you are listed along the top of the screen as soon as you select the action option and you simply choose the object you want to use from this list.

Talk can give you clues to the items your character needs. All of the characters are incessant chatterers, indicated by speech balloons appearing from their mouths. Some of the words are not very nice and in one game I played the same swear word appeared on the screen three times in succession. The games market is aimed at young people and many will buy this game on the strength of the hit record 'Living Doll' and I see no necessity for trying to maintain the swearing aspect of the TV series by using language which would make Cliff Richard blush.

While I'm up on my soapbox, why include a lit joint as one of the objects? Surely games dealing with these kinds of subjects should carry some sort of warning on the box?

Walk allows your character to move to an adjoining room. Tactics are essential to successfully collect and hide items which you know the other characters are looking for, but be careful, they may get their own back!

All things considered, this is a good game but marred by its dubious taste in certain areas. Fans of the TV series will love it and have a distinct advantage over those who have never seen it before.



the Young Ones


YOU AND THE ENEMY — ONLY ONE OF YOU WILL SURVIVE
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Screen shots are taken from the C 64 version; C 16 and VIC20 do not have ground objects.

THE SOFTWARE



Entering the offices of Palace Software isn't quite like going into any other software house.

"We're inside the Scala," Tim Matthews told me when I rang to arrange a visit. The Scala, for the benefit of those lost souls not living in London, is a well known, though rather run down looking, art-house cinema in the King's Cross area. If you want to go to all-night showings of horror movies or watch episodes of cult TV series like The Avengers or The Prisoner, then you go to the Scala.

As I walked into the cinema's foyer a billboard announced the week's main feature — 'Stranger Than Paradise'. And as I walked up the long darkened stairway to the Palace Office it occurred to me that this might well be a suitable home for the company that brought The Evil Dead and Cauldron to our computer screens.

However, the inside of their office turns out to be busier and brighter than the exterior. The first office is the admin area, where managing director Peter Stone and his right-hand person Matthew Tims are busily taking 'phone calls. Scattered all over the place are boxes full of their latest release, Cauldron II (just the Commodore version, the only version finished as yet). There's also a large number of German versions of the game sitting on a shelf — did you know that Cauldron in German is 'Hexenkuche'? — and Peter is talking to somebody about the Schneider (the German marketing name for Amstrad) version of the game over the 'phone.

This seems like a good place to start, so after the introductions





PALACE



I ask Peter about Palace's overseas activities.

"Cauldron did incredibly well in France and Germany. France only has one main computer magazine, called 'Tilt' and we won their equivalent of the game of the year award." This award is called the 'Tilt D'or' (which meals tilt of gold, though I suspect that it loses something in translation), and there was even a televised award ceremony.



"We don't expect to be like Ocean, but we want to be a name to look out for."

So how did Palace Software get started, and how did they end up in the Scala?

A few years ago Peter and Richard were running Video Palace, a large video sale and rental store in London and were doing very well with computers and games. That was the side of things that most interested them so they decided to take the plunge into games. Richard wrote The Evil Dead and they've gradually built up since then.

"We're in a fortunate position as we're financed by Palace Films. I'm not saying that money is no object, but we've been able to proceed at our own pace. A lot of time has been spent finding good programmers, good artists."

And what about the offices? "Well, they're cheap."

The first stage for Palace was when Richard wrote Evil Dead on his own. Then they found an artist, Steve Brown, and spent a year working on the various versions of Cauldron. But one release a year isn't really financially viable, so they've added to their staff and the next step should be the release of four or five good games a year.

"We don't expect to become like Ocean," Peter told me. "But we want to have a small number of superb releases and become a name to look out for."

The Palace programmers

Leaving Matthew to handle all the 'phone calls, Peter shows me into the next office, where the Palace team are at work on their current projects. This is more like an artist's studio than most programmers' offices — you walk down a short wooden staircase into a high-roofed room with tables and benches piled with computers, monitors, and the like, all round the walls. And, of course, the Palace programmers, Daniel Malone, Mark Eason, Chris Stangroom, Stanley Schembri, project leader Richard (Evil Dead) Leinfellder, and Steve Brown the man behind the two Cauldron games.

Except that they're not all programmers. Of the half dozen strong team, only Richard, Chris and Stanley are programmers. Daniel, Steve and Mark are artists, and there's Richard Joseph, a musician who works at home, "because it's too noisy here."

So this isn't the usual sort of programming team, and Peter explains how Palace games are produced.

"We work a bit differently to some software houses. We've got three artists who design the games and liase with the programmers to see what can be done. The artists often get ideas that initially seem impossible, but ideas are continually refined. Cauldron II strained everyone because of the amount of graphics, and Steve and Richard worked side by side for nine months to

THE SOFTWARE PALACE

ensure that it could all be done."

Which brought us neatly onto Cauldron II. I'd seen the Commodore version running, which looked like fun, and as I'd enjoyed the original Cauldron game on the Spectrum I felt that was a good enough excuse to go along and visit Palace and see if a Spectrum version of Cauldron II was on the way. And, as it happens, the Spectrum version is due for release at the end of July.

Steve is one of the artists on the Palace team. At college he did some work on animation which is what led him into computer graphics. He showed me an unfinished Spectrum version that Richard was still working on, which looked identical to the '64 version.

"The graphics transferred straight over. The map is exactly the same, though the rooms are slightly smaller because of the size of the Spectrum screen."

The Commodore version has some nice sound effects, so I asked the usual question about how the Spectrum version compares on sound.

"Not bad actually, considering," Steve told me. "The sound guy's done really well."

The Pumpkin Strikes Back

Cauldron II follows directly on from its predecessor. At the end of the first game the witch has destroyed all but one lone pumpkin. In the new game the Pumpkin takes the central role and attempts to defeat the witch. You have to guide him/her/it through the dangers of the witch's castle to reach her bedroom where you can cut off a lock of her hair and then drop it into the cauldron hidden in the castle dungeon.

The game has 128 screens through which you have to bounce the pumpkin (a skill in itself). Anything that moves is deadly, and there is a host of strange creatures out to get you; skeletons, gargoyles, hunchbacks, and even a stuffed pig's head, among others. There are also a number of magical objects that you will need to get you all the way through the castle, but I'm not going to tell you what they are. Like the witch in the last game, the pumpkin has a limited amount of magical energy that he can use to zap his way past monsters.



One of the advantages of the Palace system is that the artists don't conceive a game for just one machine and then worry about how to convert it onto another. They try to simultaneously plan a game for Spectrum, Commodore and Amstrad machines.

Where both Cauldron games score is in their design. They're not state of the art icon driven arcade/strategy games, but they are highly addictive and enjoyable games with lots of character, probably due to the emphasis on the artists in the team rather than the programmers.

'We're often told off by the programmers for wanting too much'

As well as Cauldron II, Palace are currently working on their next planned release, a little something called The Sacred Armour of Antiriad. The idea for this game came from Daniel Malone who also has an artistic rather than a programming background. Daniel has always been interested in science fiction/fantasy comic strips such as Judge Dredd, and when Antiriad is released it will come with a comic book included in the packaging.

"Daniel started working for us, fiddling around with graphics," Peter explained. "Then he came up with a concept for a game and the story behind it sounded like a comic, so we asked him to produce a comic which will be released with the game."

Do people like Steve and Daniel feel that the restrictions of working with computer graphics allow them to achieve what they want? And how do they design their graphics — on the machines or on paper?
"The graphics are designed on paper, and we have to put up with what we can get on the machines. We're often told off by the programmers for wanting too much."

'Can you imagine a game based on Absolute Beginners?'

For the immediate future, Palace are busy working on Antiriad plus two other programs that they don't want to say too much about, though Peter did tell me that one of them is being produced out of house by Binary Visions, the two-man team responsible for Martech's Zoids.

Towards the end of the afternoon we got chatting about the activities of various other software houses, including George Lucas' games company, Lucas Film Games. Like Lucas Film, Palace are also linked with a film company, so I asked Peter if this was likely to lead to any film tie-in games. Surprisingly perhaps, since every other software house seems keen to get the rights to film/TV titles these days, Peter didn't seem all that worried about the possibility.

"We do get lots of hassle from the film company but we're not too keen on them. We were hassled about doing a Company of Wolves game and an Absolute Beginners game — can you imagine a game based on Absolute Beginners?"

The trouble with doing tie-ins, Peter told me, is that if you're selling games internationally a name that is well known in one country might not be at all well known in another so you don't gain anything from the tie-in. That's why Palace ended up not working on a proposed tie-in with the pop group Madness.

There was just time for a few quick photos, with everyone trying to look wacky (the way programmers always do in pictures) before I headed back to our own offices, leaving the "funky cinema atmosphere" of Palace behind. That atmosphere certainly made a pleasant change from the bland offices of many other software houses, and if what I saw there was any indication, then there's likely to be some fairly 'funky' programs coming out of there this year.

Carol Brooksbank diagnoses an excellent utility for microdrive owners.

M/DRIVE Doctor.

M/Drive Doctor
Pipeq Systems
£7.50

This is a truly splendid utility, and one which every Microdrive user ought to own. Once loaded, it gives fifteen extra BASIC commands which all take the form of a keyword preceded by '*'. If only Microdrive syntax were always that simple! They work on the default drive — drive 1 on loading, but this can be altered by the * POINT command.

Formatting

The * FORMAT command greatly increases cartridge capacity. I formatted two new cartridges using the normal FORMAT, which gave 86K and 87K. * FORMAT gave 98K and 101K respectively. This feature alone would persuade me to buy this utility, but it is only the first of a number of new facilities which make you think that, if it can be done, Sir Clive should have thought of it in the first place.

* CAT, for instance, gives a directory readout which shows file title, file type, auto-start line number if any, the start address and number of bytes in a machine code file, and the cartridge name and space capacity — a great improvement on the normal alphabetical list which tells you nothing about the files. * INVERSE allows you to change any file name at will. * MERGE lets you load auto-start programs without running them, just as you can with taped programs. * NEW works like the normal NEW, except that it preserves these extra commands.

*MOVE, if you have two drives, will make a backup of the cartridge in drive 1 onto the one in drive 2, which must either be new or contain unwanted files, because anything already on it will be lost in the process. Although the handbook claims that this option will copy any cartridge, there are some program protection methods which resist it. Superchess 3.5, for instance, shows only one short program in the directory when you CAT the cartridge, though the spare capacity shows that there is another long program present, but invisible in the directory. * MOVE copied the whole tape — the spare capacity figure showed that — but when the program ran, the loading screen appeared, followed by a 'file not found' report. That aside, however, * MOVE lets you back up most cartridges, and is a great boon if you are trying to rescue a damaged one.

The remaining extra commands allow you to rescue files from damaged or faulty cartridges, without having to have any detailed knowledge of the makeup of Microdrive channels and sectors. If you have a file which refuses to load, you first use * LLIST, which gives a list of all faulty sectors on the cartridge. * RESTORE, followed by the sector number, will mend a good proportion of them, but even if this fails you can still salvage it.

* READ will list the sectors in a file, and * BIN gives a readout of all the sectors on the cartridge showing whether they are used or free. You select an unused one, and copy the faulty sector to it using the * LOAD and * SAVE commands. These actually copy a specified sector into a buffer, and save the contents of the buffer back to the cartridge on the sector of your choice. You can change the data if you wish by POKEing the buffer locations. The checksums are recalculated automatically, so data can be changed freely and the new sector will be properly saved. If your file contains text, * CHR$ displays a sector's contents in character form, so you can simply read it. * ERASE reclaims an unwanted sector, such as the original faulty one from which you copied the data, and you will find that the file will now load, even though the data itself may still be corrupted.

```
tempTU3

D86001
D86002
DB86003
PAYLIST
TASCODE1
TASCODE2
TASCTRL
TASTABLE
crenv
crlett
crlist
crs
epsonhr
list
print
run
tas

41
```

```
PAYLIST     PRINT
run         LINE 00020
crlist      PRINT
TASCODE1    CODE 48002,10239
D86001      PRINT
DB86003     PRINT
TASCODE2    CODE 27392,10239
D86002      PRINT
TASTABLE    CODE 37888,06160
crs         PRINT
list        PRINT
TASCTRL     CODE 25000,02391
crlett      PRINT
tas         LINE
crenv       PRINT
epsonhr     CODE 23296,00256
print       LINE

tempTU3
41
```

Fig.1. The display produced by the normal microdrive CAT command.

Fig.2. The much more detailed display made available by the new * CAT command.

Edit

There is a separate Editor program, easier to use than POKEs into the buffer, which allows you to examine and alter, if necessary, a sector's contents. Nine bytes of the sector are shown at a time, with the decimal number stored in each and the character if it is the CODE of a printable character. A cursor line across the screen shows the current byte. Keys 6 and 7 are used to move the cursor back or forward, and keys 5 and 8 to increase or decrease the number stored in the byte. This may seem a bit odd to someone who has only ever lived with a Spectrum+ or 128K model, who might not know that these are the 'arrow' keys on the rubber-keyboard models. Again, the program calculates the checksums when you re-save the sector, so no specialist knowledge is required, unless, of course, you are salvaging machine code files when you would need to understand machine code and the program concerned.

The screen output can be sent to the RS232 interface, or to a ZX printer, by diverting stream 2, or a screen dump will give a hard copy of everything except the output of the Editor program.

All the commands are very easy to remember and use. After ten minutes with the program I found that I hardly needed the handbook. I shall probably spend the rest of the week * MOVEing my files about so that I can * FORMAT all my old cartridges and save myself a fortune in new ones with all the extra capacity.

This program is a must for Microdrive owners, and Pipeq also market a QL version and are currently working on a Wafadrive one. The program is *only* available by mail order, so you will need their address: Pipeq Systems, 471 Hornsey Road, Hornsey, London N19.

ACROSS THE POND



Mark Fendrick brings news of how the Sinclair buy-out has affected American users, and of the highly successful Sinclair Computerfest.

As we here in the States were just getting used to the fact that we were now selling and supporting an actively produced Sinclair computer (the QL), Amstrad bought the Sinclair computer rights, casting a shadow over the future of this micro. Sinclair support in the US had always been tenuous, but now we were joined by our brethren across the pond.

However, an event was about to happen which would breathe new life into the QL. Just before the Amstrad deal, A+ Computer Response, of Keene, New Hampshire, bought all the remaining Sinclair US stock to become the sole US distributor.

A+ Computer Response is a young company founded by Carol and George Whitham. They were previously involved in selling Apple, IBM and now IBM clones and peripheral products. The QL came to the Whitham's attention in 1984 when on a trip to London they met Nigel Searle (of Sinclair) and the folks at Psion. They would not soon forget this remarkable micro.

Mrs Whitham first became interested in computers four years ago when she met her husband, who was then working for EMF (Sinclair's former authorised service centre) in their marketing service. She was hired by Micro Services of New England, Inc., a local Apple dealer, for office work in the store. However, it was not long before she was selling, and became the top salesperson — "beating all the men", as she is proud to point out. She eventually became manager of the store. At one point, Mrs Whitham was supplying Apple computers and equipment to 72 schools in three states.

At the beginning of 1985, A+ Computer Response was founded. Just weeks before the surprise sale of Sinclair's computer business to Amstrad, A+ initiated talks with Terry Shurwood, then director of Sinclair, USA, about becoming the US distributor of Sinclair technology. A+ believed that Sinclair was trying to market the QL in the US with little or no support from the UK. Mrs Whitham felt that Sinclair needed support for the QL from people who cared and were committed to the success of the computer. Carol and George certainly fit that bill, and the deal was signed. A+ Computer Response has purchased the entire inventory of US QLs, monitors, printers, flat screen TVs and assorted software. A+ will not be selling directly to the public as Sinclair had been doing, but rather will set up a national network of authorised dealers to carry the line. The initial response has been greater than had originally been anticipated according to Mrs Whitham. Initial estimates indicated that there should be enough stock for about two years, although A+ is committed to supporting the QL well beyond that time, perhaps with additional production. The QL will be supported with national advertising (unheard of in the US under Sinclair's marketing) and faster shipment of stock than was previously the case.

Microfair USA

As I write these words, George and Carol Whitham are boarding an airplane for London where they will attend the ZX Microfair, and meet with the folks of Amstrad Consumer Electronics, PLC. (A stop in to see Bryan Ralph is also on their schedule.) They are truly committed to continued support of the QL, and its varied range of products, here in the States.

The first indication that we had about a new spirit in the American Sinclair community



was the first Midwest Timex/ Sinclair Computer Fest just held in Cincinnati, Ohio. This was the first gathering of the Sinclair community since the Boston Computer Society's Sinclair Celebration in October 1983. What started as an idea for a small gathering attracted Sinclair dealers and users from every part of the United States and Canada. Many of the dealers who have been part of the American Sinclair scene for years finally had a chance to meet and be met by their customers. Unlike in the UK, the Sinclair market in North America is almost entirely a mail order business. Although I have known most of these folks for a number of years, this was the first time I got to meet most of them. Finally familiar names and voices could be connected to faces.

Although they are the newest member of the Sinclair family, A+ Computer Response was an important last minute addition to the show. They lent support to the organisers, came as exhibitors and donated a prize of a complete QL system (QL/monitor/printer) as a grand prize. There was great interest in the QL from those in attendance, as well as many questions for A+ from the newly authorised dealers, many of whom were also exhibitors.

Even though it has been more than two years since Timex abandoned us, and only a few short months that Sinclair had been back in the North American market, quite a few new products made their appearance in Cincinnati. From the enthusiasm and activity at this show, you would never have guessed that these people were users of computers which had been out of production for more time than they had been in production.

Zebra Systems, Inc. battled with the clock to introduce two new software packages for the T/S 2068. . .the latest in a long list of new products they have introduced in the last few months. As owner Stewart Newfeld drove the van to Cincinnati, Zebra's programming staff was finishing the final testing on Banner Designer and Poster Designer. They would fly to the show in time for the Saturday morning opening. These programs were shown along with ZTERM terminal software, OS-64 — the 64 column operating system cartridge, the FDD disk system, and all of Zebra's extensive product line for the Sinclair computers.

On to the Knighted Computers booth where I had a chance to meet two more of the folks I had known for a while, but never met — Ray Payne and Joe Aiello. Knighted has made its mark on the North American market by obtaining the rights to Spectrum games and translating them to run on the unmodified T/S 2068. They have the rights to the entire Quicksilva range and have just obtained rights to Durell's Spectrum games. They have over thirty of these modified programs on the market right now including a few from Virgin and Digital Integration. These programs are able to take advantage of many of the features of the T/S 2068 not found on the Spectrum.

US Software

The first US release of software for the QL was War in the East. . .a classic in its own right. Written by Mark Stueber, of Sharp's Inc., War in the East was originally written and released for the ZX-81 (T/S 1000) computer. When the T/S 2068 was released, Mark took advantage of the colour and other improvements in the new micro, and the second version was released. The further improved graphics of the QL — most notably windowing — were taken advantage of and the QL version of War in the East is a reality. It is now a four part program, with a basic module and three scenarios available. This program combined with the QL RGB monitor produces truly amazing graphics.

Continuing around the exhibition hall I encountered AERCO, whose disk drive systems have become the standard in the Sinclair community in North America since the earliest days of the ZX-81. Long spoken about, and now being displayed at the Fest was the T/S 2068 licensed version of CP/M-R/PM. At one of the 12 hours of lecture/ demonstration that was presented during the two days of the show, Jerry Champkis of AERCO ran some of the more familiar CP/M software on the T/S 2068 running RP/M. The AERCO display was probably the busiest during the course of the show, so I did not have much of an opportunity to speak with Jerry, a situation soon to be corrected.

If you were interested in mass storage but did not want to spend the money necessary for a full disk system, you probably checked out the Damco booth. Damco is the US distributor of the Rotronics Wafadrive. The Wafadrive will work on a T/S 2068 which has been Spectrum emulated for both hardware and software. Damco has developed the rainbow interface which accomplishes that emulation in a single device which fits onto the expansion bus of the T/S 2068.

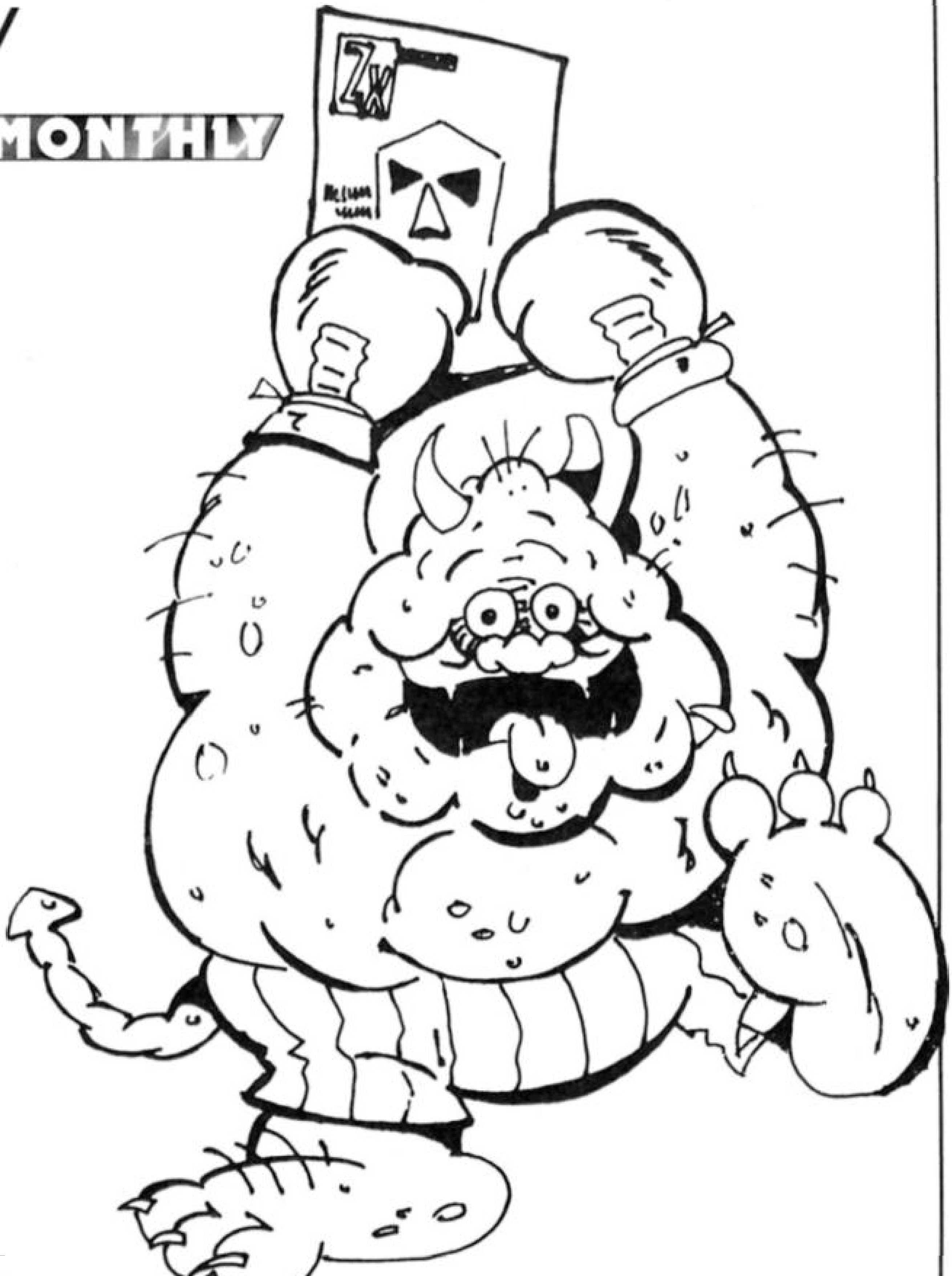
One of the surprising aspects of this show was the amount of interest that still exists in the ZX-81 (T/S 1000 and 1500) computers. I had the privilege of being asked to lead a discussion on current uses of the ZX-81 (one of two discussions I was pleased to be asked to conduct) computers, and was surprised that there was a standing room only crowd for a discussion which could have gone on for many hours. There are still business applications, robotic applications and home applications being relegated to that wondrous micro despite all the announcements of its demise.

This show has sparked interest in holding such gatherings all across the country. A+ has spoken about a series of shows which would be held in NY City, Boston, South Carolina, Arizona, San Francisco and who knows where else. The North American Sinclair users are not about to pack it in!

What about the grand prize of a complete QL system, you ask? It was won by 21 year old David Jaruzalmi, a student at the University of Cincinnati. David had been visiting the show with a friend. . .not having a computer of his own — until now. He was at home when he was notified that he had won, and returned to the show to pick it up. David was very excited at having won this state of the art system, although he did not yet known to what use he would put his prize.

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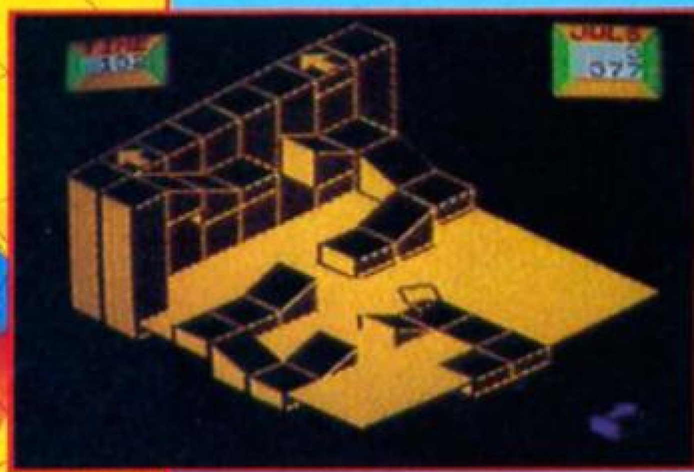
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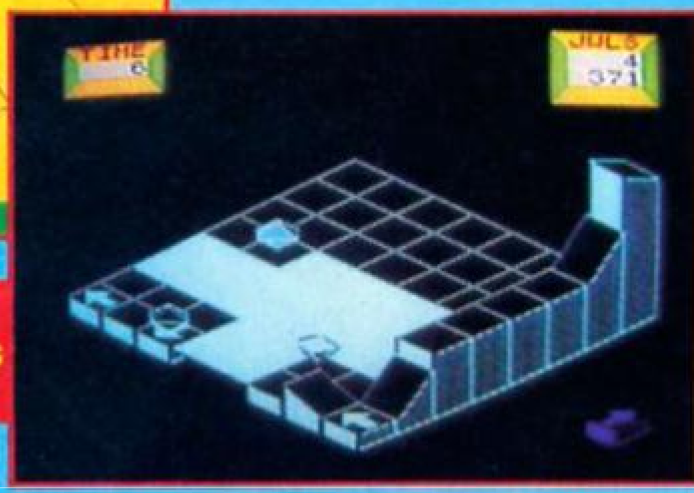
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Beware the spin-off in this addictive gyro-jaunt from Electric Dreams.





Spin Dizzy
Electric Dreams
£9.95

It isn't often a company releases a game so good that everyone who sees it is immediately anxious to play, but Spin Dizzy is one of those.

You play a much maligned Trainee Assistant Cartographer for Unknown Worlds, who has been given the responsibility of mapping a newly discovered artificial world that just happens to be hanging in space. The RSC (Remote Scout Craft) you have been given is affectionately known as GERALD, and due to GERALD's age and condition (old and bad respectively!), it's going to be very difficult to complete your task.

Your ship's computer has an initial graphics map of the area you must explore, but does not give any details of routes that must be taken. To enable you to last a little longer there is a liberal supply of energy crystals — each of which ups your dwindling time a little.

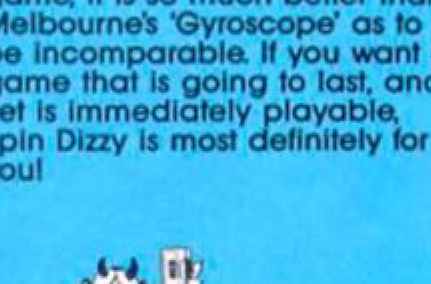
As this new world is hanging in space, it isn't a tremendous idea to go falling off the edge; in fact it loses vital seconds! Once loaded, getting into Spin Dizzy is very simple, and is made even easier by the inclusion of a beginners' section due east. Using the map is an essential part of successful Spin Dizzy play, although to get really good and fast you must make your own — much more detailed version — and it can be displayed at any time, simply by pressing the 'M' key.

Spin Dizzy certainly owes a great deal to its famous arcade predecessor, Marble Madness, as both the graphics and the feeling of gravity are very similar. You are scored on three counts; percentage of area mapped, percentage of crystals found, and percentage of game completed. Graphically, Spin Dizzy is excellent. The 3-Dimensional feel is impressive, and the ability to move around any vertical objects greatly adds to the realism (???) of this game. One of the best features of the game is the alterable viewpoints. This means that if, using your current view, a tower obscures your vision, you simply press numbers 1-4 and hey presto! the view has been spund round by 90 degrees.

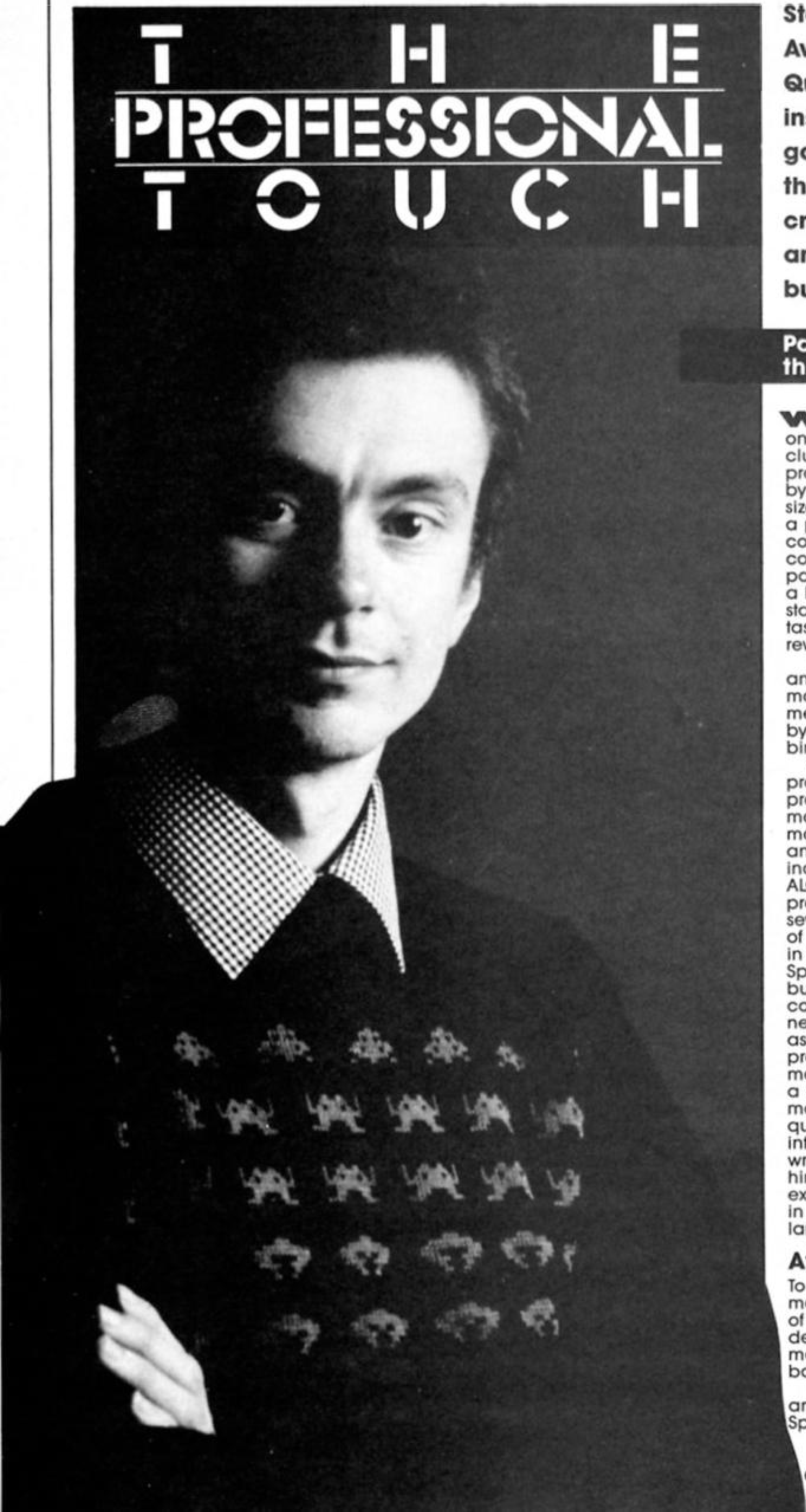
Another neat little touch is the ability to change GERALD's form. To start with GERALD is an upside down pyramid, who spins whenever he moves; however, by pressing the 'C' key, GERALD can become a gyroscope or a ball. One little tip I can give you is — don't use the ball!!!

After a few hours play, I managed to score a measly 7% overall, but within two days I had scraped up to 15%. Even to get that far however, I had to cope with many interesting features, including trampolines, ice and some devilish jumps! But however much I loved this game I do feel that £9.95 is too much to charge for a game whose audience can ill afford that type of money regularly. How can these companies expect people to buy all their releases when each one costs around ten pounds?

Overall Spin Dizzy is a great game, it is so much better than Melbourne's 'Gyroscope' as to be incomparable. If you want a game that is going to last, and yet is immediately playable, Spin Dizzy is most definitely for you!



THE PROFESSIONAL TOUCH



Steve Turner, author of Avalon, Dragontorc and Quazatron gives an insight into how the top games are created in the first part of a series crammed with hints and tips for the budding programmer.

Part 1: Designing for the machine

When I was fifteen I joined one of Britain's first computer clubs. The machine we programmed had all of 1024 bytes of memory and was the size of a desk. Before it could run a program a language compiler had to be fed in. This consisted of a huge reel of paper tape that spewed out into a huge plastic bin. Finding the start of the tape was a major task, as the spool had to be rewound for the next session.

The computer printed its answers onto a teletype machine, and there was no method of inputting data except by paper tape or feeding in binary numbers one at a time!

So began my passion for programming. Since then I have programmed a variety of machines from the largest mainframes down to the ZX80, and in many languages, including COBOL, FORTRAN, ALGOL, several machine codes. I programmed commercially for seven years, rising to the position of Project Leader. I gave this up in the early days of the Spectrum to start my own business, programming computer games and have never looked back. I'm often asked, "How do I begin to program?", "how do I learn machine code?", "how do I write a game?". Over the next few months I shall try to answer these questions and give an insight into how a professional games writer works. I shall be giving hints and tips for beginners and experienced programmers alike, in both BASIC and assembler language.

Attributes

To get the most out of a machine you need to be aware of its abilities. What are the design restraints? What is the machine good at? What is it bad at?

The single dominant factor in any graphic design for the Spectrum is the limitation

imposed by the resolution of the colour attribute map. This means that unless you design carefully, graphics will be surrounded by squares of coloured attributes, looking messy and primitive. There are several ways around this problem:

1. Void background

The background of the screen is left blank or nearly blank, usually coloured black. Coloured objects can be moved around with their attributes quite safely as long as they do not overlap. This technique is suitable for space games or platform games such as Space Invaders, Lunar Jetman or Avalon. In Avalon I used the fact that the attributes around the main object colour the background features to make it look as if the wizard is glowing, lighting up the scenery.

2. Two colours only

Here, the main playing area is restricted to just two colours. The Spectrum's pixel resolution is high enough for shading to be employed to give a range of tones and textures. Examples of this type of program are Knightlore, Fairlight, and my own Quazatron. You can make up for the lack of colour on the playing screen by using colour in static displays around the main playing area.

3. Many Papers but one Ink

Colour is applied using the Paper attributes, but the Ink attributes are common to the whole playing area. Thus, moving objects in the Ink colour do not cause attribute problems.

Sound

The lack of a sound chip in the 48K Spectrum means that processor time is taken up when producing sound from the machine. To enable simultaneous sound and program execution the processor must be shared. Using the Z80 interrupts are one way of doing this, though better sounds are possible in static moments of the game as the whole of the processor is available for use. The design of the game should utilise such moments where the game has a natural pause.

CPU speed

The Spectrum's best feature is the ability of the Z80 chip to execute its large instruction set at speed that allow the program to compensate for the lack of a proper video or sound chip. But it is important to realise the limitations of this speed.

If, for example, the whole screen has to be refreshed (redrawn, as when you enter a new room in a game), the best rate that this can be carried out at is about five refreshes per second — too slow for smooth animation.

The design must overcome this by use of more sophisticated techniques or a smaller moving screen area. Because the CPU has to do everything it has to be pushed to its limits by efficient programming. Note that the important factor that determines how good a machine is for games is the screen resolution to CPU speed ratio. Higher resolution slows the machine down!

Inputs

The lack of a built-in joystick port means that keyboard play, as well as the many types of joystick must be catered for. It's very difficult to play with four direction controls and a fire button on the keyboard, so this has to be thought out carefully. The control method will greatly affect the playability of the game.

Backup storage

The lack of a standard disk drive for the Spectrum means that to be commercially viable a program must cater for a whole range of devices, or for none at all.

Memory

The 48K Spectrum has large areas of memory that are accessed about one third slower than other areas (the lower 16K of RAM, for instance). So these areas are best not used for graphics or for routines that need to be executed very quickly. The BASIC variables, etc, can all be utilised if total control is exercised over the machine by switching the Sinclair keyboard interrupt off. In practice, I find it impractical to develop machine code programs for the Spectrum larger than about 15K of object code. The rest of the machine is usually full of graphics, data and some sort of development tool.

Coming soon . . .

In later articles I shall go into how to make the most of each of the Spectrum's abilities. This month's example program is a useful little utility that I use when programming in BASIC (I use BASIC extensively, to prepare the data, text, and graphics for my games).

Delete routine

MERGE this with any BASIC program that starts at line 10 or more. RUN the program and then enter the first and last line numbers to be deleted, but never include line 1 in this or you will crash the Spectrum by deleting the machine code while it is being executed.

To set up the program:

1. Type in the following listing, taking care to type in the REM statement at the beginning so that there are at least 18 characters for the machine code after the REM, also take care to copy the DATA list correctly.
2. SAVE it in case you have made a mistake.
3. GOTO 200 to load the machine code.
4. RUN, then enter FROM 200 TO 999 in response to the prompts onscreen, to get rid of the machine code loader statements.
5. The utility is now ready for use. SAVE it in its 'ready' form to tape or disc. To use, MERGE it with a BASIC program that you wish to edit.

The machine code does the following:

LD HL, FROM	FROM is poked from Basic.
CALL 196E	Call 'find Basic line address' routine.
PUSH HL	Push the address of the found or next line onto stack.
LD HL, TO	TO is poked from Basic.
CALL 196E	Call monitor to find the 'TO' line in Basic program.
POP DE	Loads DE with the FROM line address that was on the stack.
CALL 19E5	Deletes between HL and DE addresses and closes the gap that is left.
RET	Return to Basic.

Basic program

```
  1 REM 123451234512345123
  2 LET ADD=5+PEEK
    23635+(256*PEEK 23636)
  4 INPUT "FROM";FF;" TO";TO
  5 LET TO=TO+1
  6 LET X=INT(FF/256): POKE
    ADD+2,X: POKE
    ADD+1,FF-(X*256)
  7 LET X=INT(TO/256): POKE
    ADD +9,X: POKE
    ADD+8,TO-(X*256)
  8 RANDOMISE USR ADD:STOP
200 REM MACHINE CODE
    LOADER
201 DATA 33,0,0,205,110,25,229,
    33,01,00,205,110,25,209,205,
    229,25,201
215 LET ADD=5+PEEK
    23635+(256*PEEK 23636)
220 FOR A=0 TO 17
230 READ B
240 POKE ADD+A,B
250 NEXT A
```

pro-77

David Nowotnik tries number crunching with a version of FORTRAN for the QL.

Pro-Fortran 77
Prospero Software
£99.95

There is already a good choice of alternative high level languages to SuperBASIC for the QL: Forth, Pascal, C, and BCPL to name the principle choices. London based Prospero Software are now adding another to that list. FORTRAN-77.

To go back into computing history, Fortran became one of the first high level languages to achieve wide spread acceptance and use on mainframe computers. It was designed for 'number crunching' applications, and was popular with scientists, mathematicians, and the like. The language was very weak in dealing with anything but numbers, so another language, COBOL, was adopted for business database applications.

Despite a number of upgrades and improvements to the language (of which Fortran-77 is one of the more recent), Fortran remains a 'number crunching' language. It's very good in this area, but users should be aware of its limitations. It is something of a surprise that a software house should issue an old mainframe favourite for a micro, with several modern and more flexible languages now available. However, Prospero see their customer as the computer professional, presumably already familiar with Fortran, using this language on the QL.

For professionals

The manual supplied with Pro Fortran-77 is certainly aimed at the professional. There is no beginners' guide, but the 170 page manual is clearly written to provide the experienced programmer (not necessarily having previous experience of Fortran) with enough information to implement this language.

In addition to the manual, held in a hard backed ring binder, this package is supplied with a plug-in ROM and three cartridges of software. The ROM, called PRL (Prospero Resident Library) contains all the library routines to operate the compiler and execute the object code produced by the compiler. Compilation cannot take place without the ROM in place, but there is available on one of the cartridges a software PRL, to allow object codes to be used independent of the plug-in ROM.

One surprising omission from this package is the lack of a text editor. To prepare Fortran source code a text editor is essential (the QL's free word-processing package, Quill cannot be used as it embeds control characters in text). So the use must obtain a text editor from elsewhere (e.g. Metacomco), at extra expense, to prepare his/her own Fortran source listings.

Examples

There were four example source programs supplied with the version (1.1) for review. The simplest is shown in fig. 1; it allows prime numbers to be identified. Compilation is a straightforward process, but cumbersome with microdrives.

With the ROM software installed, pass 1 is executed with software on cartridge 1, pass 2 with software on cartridge 2, and linking to routines in the non-resident library (which finally produces the executable object code) takes place using software and library routines on cartridge 3. However, with discs, or (even batter), RAM discs, the whole process is easy and fast.

The compiler has a list of nine options, allowing additional files to be produced by the compiler to aid diagnosis of faults. During compilation, any errors are reported on the screen (and can be dumped to a file). A listing of error numbers appears in one appendix in the manual, although the messages on the screen can be expanded with informative text provided that the compiler has access to the 'profor_err' file on cartridge. Fatal and non-fatal errors can be identified quickly by the sensible error coding system.

Compilers

Prospero Software produce Fortran compilers for some other 68000-based micros, and one of the attractions for the professional of using this package is the potential for using the same source code on several machines. But, in addition to standard Fortran, there are several non-standard opcodes specific to the QL, available in the non-resident library. Most of these relate directly to the SuperBASIC graphics commands, although there are some useful extras, such as WSTATP, a function which returns the size of a specified window, and the current graphics cursor position.

The microdrive cartridges alsc contain programs which carry out any desired changes in configuration of the compiler programs, and the object codes, and a library routine for adding/modifying routines in the non-resident libraries.

Apart from the one amazing omission (no text editor) this is a powerful package. The price is high (RRP £99.95), but is just within the current price range for high level language compilers for the QL. That price is probably realistic bearing in mind that the appeal of Fortran on the QL will be very limited.

Fig.1. Example Fortran listing from Pro Fortran-77

```
      PROGRAM PRIME
C
C   Repeatedly asks for input of a number and prints
C   out its smallest factor, or says it is prime
C
      INTEGER*2  FACTOR,MAXFAC
      INTEGER    NUMBER
C   Start of main loop
  10  WRITE(*,900)
900   FORMAT(' Input a positive number',
    -          ' less than a thousand million: ')
      READ (*,*) NUMBER
      IF (NUMBER) 10, 10, 20
  20  WRITE (*,920) NUMBER
920   FORMAT(' Smallest factor of ',I9,' is :')
C   Is it divisible by 2?
      FACTOR = 2
      IF (MOD(NUMBER,2)) 30, 60, 30
C   Number is odd, so try all odd divisors up to sqrt(number)
  30  MAXFAC = SQRT(FLOAT(NUMBER)) + 1
      DO 40 FACTOR = 3,MAXFAC,2
      IF (MOD(NUMBER,FACTOR)) 40, 60, 40
  40  CONTINUE
C   Number is prime
  50  WRITE (*,940)
940   FORMAT(6H Prime/)
      GOTO 10
C   Number is composite, provided "factor" is not "number"
  60  IF (FACTOR.GE.NUMBER) GOTO 50
      WRITE (*,960) FACTOR
960   FORMAT(I6/)
      GOTO 10
      END
```

CROSSWIRES

Our technical wizard Ray Elder unravels your Sinclair computing problems

Leads

Dear Sir,

Q *Another printer problem I am afraid! I have a Spectrum 128 and a Brother M1009 and was supplied with the QL series lead for the connection. This initially failed to work but once I had discovered that the baud setting had to be adjusted in the printer to 9600 LPRINT and LLIST produced excellent results. The problem occurs if I attempt to use control codes to change the typeface etc. Any such attempt usually results in a message "File Completed" and a temporary loss of any output from the printer. I have an interface 1 also fitted to the 128 for microdrive control but removing this made no difference at all.*

Sinclair have published no information on the RS232 interface and its connections and my letters to them have gone unanswered (despite SAE's). I have seen no mention of a special lead for the 128 but perhaps the wiring is in someway different from that of the QL. If all else fails do you know whether the lead suitable for interface 1 and a serial printer would work with the 128? I don't want to spend another £10.15 on yet another lead if that also won't do the job.

I suspect you may well have had numerous other letters of a similar nature to mine and look forward to receiving any advice you can offer.
J. Walters,
Leicestershire.

A If your printer LPRINTS and LLISTS correctly then the lead is O.K. The problem is in the way the Spectrum is sending control codes. Try using control codes within an LPRINTed string. The code for 'italics on' is usually CHR$ 27 followed by CHR$ 52 (or ESC 4 as manuals tend to put it). The spectrum can be set to do this by the following lines:

```
10 LET P$ = CHR$ 27 + CHR$ 52
+"TESTING ITALICS MODE"
20 FORMAT "b";9600
30 OPEN #4; "b"
40 PRINT#4; P$
50 CLOSE#4
```

Note the use of the "b" channel, and you may have to change your printer to automatically use an LF with a CR.

Printer Problems

Dear Sir,

Q *I am writing to you seeking your advice on the Serial 8056 Compact Printer. I have just recently purchased the printer along with a 128K Spectrum. I don't think that there's anything wrong with the RS-232 interface, or the computer, and the printer passes the 'self-test' in the accompanying manual, but I can't seem to print anything else out. Maybe I'm doing something wrong? Could you please! please! help me!*
Sean Covenay,
Bolton.

A I really need more information about exactly what you are doing. Try the program suggested for Mr Walters. The routine is to FORMAT "b";9600 where you can use 'b' or 't';"b" for complete 8 bit codes (Printer control) or 't' for text only, and the 9600 represents the baud rate of the printer (check your manual). Now open a stream to it by **OPEN 4;"b"** and then send you text by **PRINT#4; "This is a test"**, finally closing the stream with **CLOSE 4.** The commands can be used as BASIC lines within your programs. If this fails then get an engineer to check the cable connections between the computer and the printer.

Fuller trouble

Dear Sirs,

Q *I am older than your normal reader, (over 40 but don't tell anyone), and I have a problem!*

I have a FULLER keyboard and it keeps 'locking up' — not only when using Tasword but other Progs (games actually — but again don't mention it as they are my sons! And my wife thinks I'm learning how to program the Spectrum.) I wondered if any one of your brilliant blokes knows what is wrong!

I have spoken to two repairers: One said it is the ULA (or something technical like that), the other said it could need a resistor on the keyboard.

Does anybody know the answer???
Neil Owen,
Prestwood.

A The Fuller keyboard is well known for this problem. In simple terms the ULA chip tries to operate at the same time as a keyboard scan. The solution is a buffer to give priority to one job. Transform used to make a keyboard with the same problem and also a buffer, they had buffers but these, they assured me, were not compatible with the Fuller.

Mancomp are a repair company who have been highly praised by many of our readers so I gave them a ring, only to be advised that you'd be better off getting a new keyboard. So there you are. I know its a blow but I am afraid you'll have to write it off. I can personally recommend for W.P. and games ANY of the Saga keyboards, the LMT/FOX unit or the DK'Tronics keyboard.

Interfacing

Dear Sir,

Q *Please, please, pretty please — HELP! I'm having problems with my Interface 1 on my 48K Spectrum. Although it's properly attached to the computer it does not accept valid commands and just prints '?'.*

I've tried cleaning the edge connector with a pencil erasor and an alcohol based cleaning fluid, as somebody at Sinclair Research suggested, but neither worked. I have had this problem before but usually it has fixed itself, this time it hasn't.

However if a CLEAR command is entered with a value somewhere between 53000 and 64000 then it is possible to catalogue a cartridge and also to enter 'run' and 'new' to load the 'run' program that I have on most of my cartridges. But if LOAD, SAVE or MERGE is entered for the microdrive then the computer LOADs, SAVEs or MERGEs by tape instead.

Also, (this may be irrelevent) although the Alphacom 32 printer and joystick I have work when plugged into the Interface, when my Protek Interface in in CURSOR mode pushing the joystick left has no effect, but it works perfectly in Kempston and Interface 2 mode. Do I have a bad connection between Interface and Spectrum, or is my Interface faulty?
Jonathan Farmer,
Edinburgh.

A There are several possible causes, one being that one of your peripherals is causing problems. Use each on its own to check that they are individually functioning correctly then use them in various combinations. If you try Interface 1 and microdrives on their own and the problem persists then, obviously, it is either your Spectrum or the Interface!

Try and borrow a Spectrum to try with the Interface, failing that take it back for replacement if still under guarantee, and get them to try a different one in the shop. If you have run out of guarantee then I suggest you try phoning a company such as Mancomp, who have been praised by many readers, on 061 224 1888, or Micro-World computers on 0484 846117. Finally if you connect your joystick I/F and it fails to operate correctly when plugged in on its own then it also has a fault.

A LITTLE BIT OF TALENT

David Nowotnik boots up the new QL assembler from Talent Systems.

Assembler Workbench
£24.95
Talent Systems

If you own a Sinclair QL, and you are into assembly language programming, then the advertisements for the latest product from Talent surely must whet your appetite. For a fraction under £25 their 'Assembler Workbench' offers a package of full screen editor, monitor (including disassembler), and assembler. And in a word, it is superb!

But, at first glance, you might be in for a disappointment! Although the product is supplied in a four cartridge case, it contains only a single microdrive cartridge with all the software. There isn't much else inside the case, only a double-sided card which serves as an instruction manual. However, this reveals that full instructions appear on files on the microdrive, summoned up using the 'help' command in the monitor program. For those who prefer a hard copy of instructions, the main help file can be dumped to printer, or a 'Quill' file of instructions can be obtained from Talent for an extra £1.50. This shouldn't be necessary, as the electronic manual is easy and convenient to use.

Boot

Booting the program takes you in to the monitor program, which is by far the star of the package. Really good use is made of the QL's window facility to place information in easily read blocks on the screen. All the facilities you could want are included in the monitor. Disassembly, hex dump, trace (with a window demonstrating the effect on the registers), changing/deleting/adding data, search, and many more. With the multi-window facility, disassembly can go to one, while a hex dump can be directed to another. All output can be directed to other devices, such as a printer.

Commands to the monitor can be immediate (pressing one of the function keys, or certain keys with CTRL), or extended. The latter are typed in, usually using a three letter keyword. If the syntax is wrong, then the correct syntax is shown on the screen, with a prompt to give you another try. In combination with the shift key, the five function keys can have user defined commands assigned to them.

In addition to supplying access to the electronic manual, the 'help' command can be extended to supply a whole host of useful information. For example, 'help -s' gives you all the system variables; their addresses, a description of their purpose, and their current values. Similarly, 'help -j' gives the job control variables, 'help -c' the channel control variables, and 'help -w' gives the window definition block data.

For de-bugging, up to 20 break points can be placed into RAM based machine code routines. Also very useful for de-bugging is the multi-window facility; the program can be traced, with a listing to one window, while graphics output of the program appears on another window.

Assembler

The assembler is accessed from the monitor using the ASM command. The first use of the Assembler requires the routine to be loaded from microdrive, and the starting address for assembly has to be specified at this stage. Although not clear in the manual, the user should reserve space before running the boot program.

The assembler is limited in its facilities when compared with products such as the Metacomco and GST assemblers, but is ideal for all but the most highly proficient assembly language programmers. The assembler can be loaded line by line from the keyboard, or a file created by the text editor is accessed using the INCLUDE command. INCLUDE can be inserted in the source code and nested to three levels, to allow modular construction of programs.

The assembler can operate in one or two pass mode; the latter produces executable binary code, while a single pass allows easier editing using standard mnemonics. Error messages are produced and presented on the screen (or dumped to printer, if desired). The binary code can be saved once created; the instruction to do this is given before assembly, or using the SBYTES OR SEXEC command from the monitor. Once assembly is completed, the user is back into the monitor routine. While the assembler uses standard 68000 mnemonics, the electronic manual fails to provide sufficient details into its use; for example, there is no indication how to embed remarks into source code.

To use the text editor for the first time, the user has to get back to SuperBASIC (pressing CTRL 'C'), and EXEC the editor file. The full screen text editor has a wide range of facilities equalling the widely known Metacomco text editor. Twenty-two immediate and twenty-six extended commands provide cursor control, insert, delete, copy, move, find, save, and load facilities. The editor is suitable for creating BASIC as well as assembly language programs. Even with the monitor, assembler and text editor installed in RAM, there is still a reasonable amount of space for text files in the unexpanded QL. However, attempting to load a text file larger than available space caused a system crash. The user can easily switch between the editor, monitor, and assembler using CTRL 'C', and redrawing the screen by pressing F4.

This product has been very well designed; the author has considered the needs of an assembly language programmer, and combined everything into a modestly-priced package, which fully deserves to become a best seller.

The QL devotes 32K bytes of RAM to its colour screen display (the Spectrum has less than 7K). This large block of memory provides the QL programmer with control over the colour of each pixel on the screen. The QL offers eight colours in low resolution mode (256×256 pixels), and four in high resolution mode (512×256 pixels) which gives the QL the potential for some impressive screen displays.

SuperBASIC provides a host of commands and functions to enable programmers to make good use of this potential. In this, and the next part of our SuperBASIC series, we'll be examining those commands, starting this month with straight line graphics.

In line

When you turn on your QL, the selection of F1 or F2 for monitor or TV mode gives you high resolution (4 colour) and low resolution (8 colour) modes respectively. All graphics commands work on both modes, although the effect on the screen of all commands is highly dependent on the display mode. So, for any program which is dependent on a graphics display (which is just about any program you could write), the mode must be correct. And, as you cannot assume that the program user will press F1 or F2 to get the mode you require for your program, every program should have a MODE command to select the correct screen set; always set up the windows (you can use TV or MON) to be certain of getting the display right.

After those rather stern, but necessary warnings, let's take a more relaxed view of the general principles of graphics on the QL.

All the QL's graphics commands can be directed towards a specific window. Later on we'll see how to deal with several windows, but for now assume that the QL is in MODE 4, and all commands are directed towards window 1, which is the default window for all commands in which the window is unspecified.

Fig.2. gives you a representation of the QL screen display in TV mode. Because of the rather thick border, the pixel size of the main window in this mode is only 224×200. But, these dimensions need not concern you. What is more important to know is the scale on which these pixels are represented. For the purpose of producing screen displays, each window can be likened to a piece of graph paper. At the bottom left hand corner is the origin of the graph paper. Like any graph the coordinates of the origin are 0,0. The first zero refers to the coordinate in the horizontal (x) axis, and the second to the vertical (y) axis. Any point in the window can be referred to using this coordinate system. But how many screen coordinates are there?

The answer to this depends on **60,50** switches on the pixel (plot in the current INK colour) at the point whose coordinates are 60 in the x-direction, and 50 in the y-direction.

Coordinates

The simple listing in fig.3a. will help you to understand this principle. Type in the program lines in fig.3a, and those in fig.1., then SAVE and RUN the program. You are asked to enter two coordinates; after checking that you have entered valid numbers, the pixel at that coordinate is plotted in a random colour. You'll have to look carefully at the screen, especially if you're using a TV, to see the points. Note that if you enter a pair of coordinates whose position lies outside of the window area, you don't get an error message; you just don't get anything on the screen.

So far we've used the default scale of 100 units in the vertical (y) axis. What happens if we change this to something else? The program lines in fig.3b. will provide a demonstration. With the previous program (the combined listing of fig.1. and fig.3a.) installed in the computer's memory, add the program lines in fig.3b., then SAVE and RUN the new program.

The first request is to enter the scale parameters. SuperBASIC has the SCALE command, which sets the plotting scale of any window. SCALE requires three parameters. The first is the

QL SuperBASIC

display mode.

MODE 4, or MODE 512 gives you high resolution (monitor) mode, and MODE 8 (MODE 256) gives TV or low resolution mode. In addition to setting the mode, you should always set up the windows to give the display you want. The listing in fig.1. gives you two SuperBASIC procedures called TV and MON, which reset the default windows and display mode back to those you get after power-up. A QL programmer should never assume that his program will start with the default windows the scale of the display in the window in question. Unless the programmer actually specifies a scale, then a default of a 100 units is set in the y (or vertical) direction. That is, coordinate 0,100 is the top left position of a window. The maximum number of units in the x-axis (horizontal direction) depends on the size and shape of the window. For window #1 in TV mode, the bottom right coordinate is 165,0.

To switch on any pixel whose coordinates are known, the QL has the POINT command. Thus, in fig.2., the command **POINT** number of points on the vertical (y) axis. Remember the default is 100, so try some other values. The second and third parameters of SCALE are the coordinates of the bottom left hand pixel of the window in question. For simplicity, start by entering two zeros; this makes the bottom left pixel coordinate 0,0, as in the default setting. In entering these three values, press ENTER after each figure. Then, as in the previous example, you enter sets of x and y-coordinates, and watch the screen to see where they go.

If, for example, you enter 200 as the first SCALE parameter, you'll find that the range of values you can enter as coordinates goes up to 330,200 (this coordinate being the top right coordinate). And if you enter 50 as the first scale parameter, then 84 and 50 are the maximum x and y values. To try different SCALE parameters with this program, break the program (press CTRL and space), and run again.

Once you're happy with the first parameter of SCALE, try other values of the second and third parameters, keeping the first constant; for simplicity, keep it at 100.

As an example, say you entered 100,10,20 as the SCALE parameters. You'll find that coordinate 0,0 no longer appears on the screen. In fact, the bottom left coordinate is now 10,20, and the maximum y coordinate is 120 (100+20), and the maximum x coordinate is 175 (165+10). So, although you have reset the origin on your window, you still get 100 plottable points on the vertical axis, and 165 on the horizontal axis.

Fig.1. Procedures to reset TV and Monitor Screen Modes

```
100 DEFine PROCedure TV
110   MODE 8: WINDOW 512,256,0,0
120   PAPER 0: CLS
130   WINDOW 448,200,32,16
140   WINDOW #2,448,200,32,16
150   WINDOW #0,448,40,32,216
160   PAPER 2: PAPER #2,1: PAPER #0,0
170   INK 7: INK #2,7: INK #0,7
180   CLS: CLS #0
190 END DEFine TV
200 DEFine PROCedure MON
210   MODE 4: WINDOW 512,256,0,0
220   PAPER 0: CLS
230   WINDOW 256,202,256,0
240   WINDOW #2,256,202,0,0
250   WINDOW #0,512,50,0,206
260   PAPER 2: PAPER #2,6: PAPER #0,0
270   INK 6: INK #2,2: INK #0,4
280   BORDER 1,255: BORDER #2,1,255
290   CLS: CLS #2: CLS #0
300 END DEFine MON
```

Parameters

Try the scale parameters 100,-10,-20. Now the bottom left hand coordinate is -10,-20. Coordinate 0,0 is set a little way from the corner of the window. The maximum coordinate values in the x and y directions are

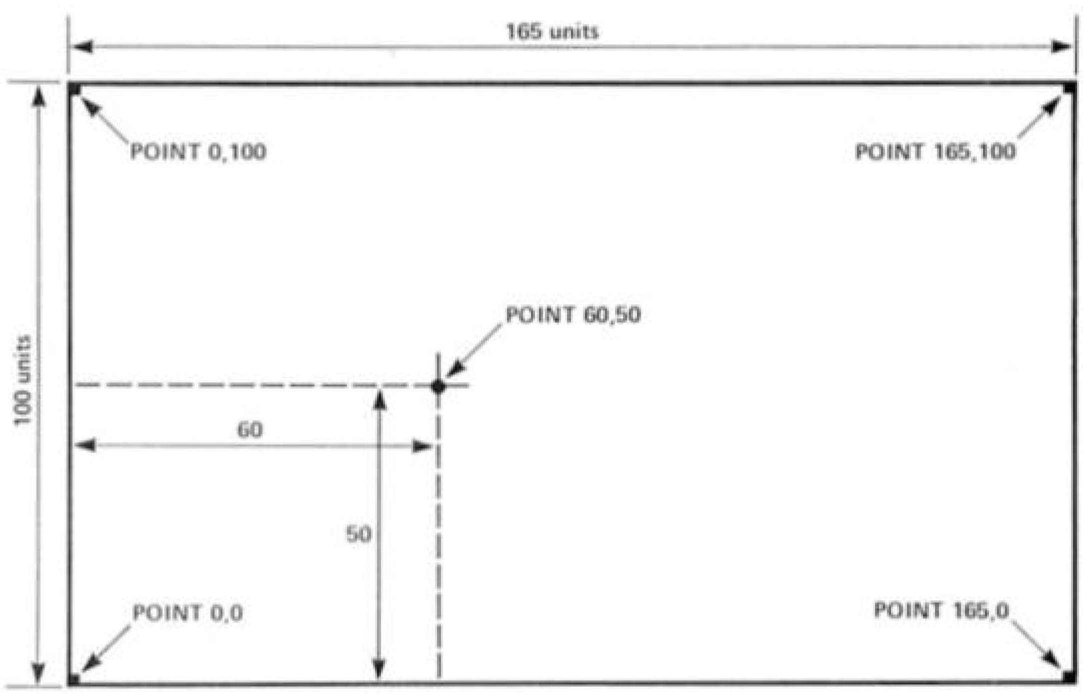
Part four of David Nowotnik's series looks at the QL's line graphics facilities.

now 155 (165+(-10)) and 80 (100+(-20)). This facility, to move the 0,0 'origin' away from the bottom left hand corner is very useful in drawing graphs, as we'll see later on.

So far we have had the squint at the screen to see the effects of our experiements. Now let's move on to drawing straight lines, which should stand out clearly.

There are two ways of drawing straight lines on the QL. The first we'll examine are the two LINE commands, then we'll go on to examine what are known as 'turtle' graphics.

The simplest way to draw a straight line is to use the LINE command. Try some examples; reset your QL, and press 'F2' for TV mode. Remember, we now have a plotting screen with coordinates going from 0,0 at the bottom left, and 165,100 at the top right. Type in as a direct command: **LINE 10,10 TO 155,90.**



This is the default SCALE; i.e. SCALE 100,0,0

Fig. 2. How to calculate the coordinates of a POINT on the screen

A diagonal line should appear, which connects the coordinates 10,10 and 155,90. Similarly: **LINE 155,10 TO 10,90** will draw the other diagonal. You can connect a number of coordinates with a single LINE command by connecting each coordinate with TO. For example:

LINE 50,50 TO 50,80 TO 80,80 TO 80,50 TO 50,50

will give you a square.

Try experimenting with a few more LINE commands. As with POINT, you'll notice that, if you

try to draw a line which extends outside of the window, the line is drawn to the edge of the window, but no error message is given.

Relative lines

The other line command is a little more complex. It is **LINE_R,** the 'R' stands for relative. It's best explained by trying it on your QL.

Clear the screen (CLS) of all the lines drawn with the LINE command. Then type in: **LINE_R TO 20,30.**

You should get a diagonal line starting at coordinate 50,50 ending at 70,80. Why? Let's look into it...

Remember we were drawing lines using the LINE command. We finished drawing a square, which ended up at coordinate 50,50. The QL remembers the last coordinate position (in each window) used in line drawings; it's called the graphics cursor. So, although the screen was cleared, the graphics cursor remained at position 50,50.

LINE_R draws a line from the graphics cursor position to a position *relative* to it; that position is calculated from the coordinates after **TO** in the **LINE_R** command. In the command we gave **(LINE_R TO 20,30)** the graphics cursor was at 50,50, so the line was drawn from this point to 50+20,50+30, that is 70,80.

You can reset the graphics cursor using the POINT command. To set the cursor back to 0,0 use: **POINT 0,0** then type in: **LINE_R TO 20,30** and you'll get exactly the same line (in length and slope) starting at 0,0 instead of 50,50.

To demonstrate **LINE_R** further, add the program lines in fig.3c. to the SCALE demonstration program (the combination of listings in fig.1. and fig.3a. and 3b.). SAVE and RUN the program. The program asks for SCALE parameters (for simplicity, set the origin to 0,0), then x and y coordinates for the graphics cursor. A diamond shape will be drawn. The program line doing this is line 1185. It is a LINE_R command; see if you can work out how the *relative* coordinates are put together to make the shape. Once you have done that, you've mastered the principle of **LINE_R.**

Demo program

The demonstration program keeps looping round, asking you for SCALE parameters, the x and y-coordinates. You'll note that as you select different scales, the size of the diamond will vary; the larger the SCALE parameter, the smaller the diamond. This

Fig.3a. A program to demonstrate the POINT command

```
10 REMark Demonstration of POINT
20 REMark ZX Computing
30 :
500 xmin=0: xmax=165
510 ymin=0: ymax=100
1000 TV: PAPER 7: CLS
1010 REPeat loop
1020   CLS #0
1030   REPeat enter_coords
1040     INPUT #0," Enter x-coordinate ";x
1050     INPUT #0," Enter y-coordinate ";y
1060     IF x>xmin-1 AND x<xmax+1 AND y>ymin-1 AND
y<ymax+1 THEN EXIT enter_coords
1070     PRINT #0
1080     IF x<xmin OR x>xmax THEN
1090       PRINT #0," X-coordinate out of range"
1100     END IF
1110     IF y<ymin OR y>ymax THEN
1120       PRINT #0," Y-coordinate out of range"
1130     END IF
1140     PAUSE 300
1150     CLS #0
1160   END REPeat enter_coords
1170   INK RND (0 TO 5)
1180   POINT x,y
1190 END REPeat loop
```

Fig.3b. Extra program lines to demonstrate SCALE

```
400 CLS #0: CLS
410 INPUT #0," Enter SCALE parameters ";y_param, x_orig,
y_orig
420 SCALE y_param, x_orig, y_orig
500 xmin=x_orig: xmax=y_param/100*165+x_orig
510 ymin=y_orig: ymax=y_param+y_orig
```

Fig.3c. Extra program lines to demonstrate LINE_R

```
350 TV: PAPER 7: CLS
360 REPeat loop
400 CLS #0
1000 :
1010 :
1185   LINE_R TO 10,10 TO 10,-10 TO -10,-10 TO -10,10
```

represents an important principle of SCALE; you can vary the SCALE parameters as many times as you like in drawing on the QL screen. For example, if you wanted to draw a row of houses in perspective, you could have a procedure for drawing a house using **LINE_R.** Then use **SCALE** and **POINT** to adjust the scale, and position the graphics cursor, to achieve perspective.

If you have just one item to draw, and you know its absolute position, then LINE is the easier command to use. But if you want to repeat the drawing of a shape several times, or the position of that drawing can be variable, use **LINE_R.**

As mentioned earlier, the alternative method for producing line diagrams is based on a system called turtle graphics. The principle is based on the computer language of LOGO. The SuperBASIC commands which simulate LOGO's turtle graphics are PENDOWN, PENUP, MOVE, TURN, and TURN TO. Here is a brief description of the principle of turtle graphics:

Turning turtle

Imagine a mechanical turtle which is able to move over the screen display under program control. If the turtle is fitted with a pen, then it will draw a line as it moves, provided that the pen is in contact with the 'paper' (the screen). The turtle moves in a straight line, but is able to turn (rotate) in both clockwise and anti-clockwise directions. MOVE is the command to send the turtle forward. There is one parameter with MOVE. This is the distance to be moved. That distance is dependent upon the SCALE of the window. So, **MOVE 20** will move the turtle 20 units forward; with a SCALE of 100, the turtle will move a distance which is equivalent to one fifth of the height of the window.

To turn the turtle you have the TURN command. The default direction of the turtle is horizontally to the right of the screen. From this position, TURN 90 will turn the turtle one right angle, to face the top of the screen. TURN 180 will turn the turtle to face the opposite direction. These movements are relative changes of direction; if you want to set the direction in a specific way, there is the TURNTO command. **TURNTO 0** will turn the turtle to face horizontally to the right; TURNTO 90 to the top of the screen; TURNTO 270 vertically to the bottom of the screen.

The position of the turtle can be set with the POINT command,

Fig.4. Symmetrical patterns with LOGO graphics

```
10 REMark Demonstration of Turtle Graphics
20 :
100 MODE 512:WINDOW #1,512,200,0,0
110 CLS#0: CLS#1
120 AT 1,30: PRINT"TURTLE GRAPHICS DEMO"
130 PAUSE 100
140 PENDOWN
150 TURNTO 0
160 POINT 100,60
170 FOR i=1 TO 40
180   MOVE 50
190   TURN 230
200 END FOR i
210 PAUSE 50
220 POINT 60,50
230 FOR i=1 TO 10
240   TURN 36
250   FOR j=1 TO 5
260     MOVE 20
270     TURN 72
280   END FOR j
290 END FOR i
300 STOP
```

must be used before moving the turtle.

Fig.4. contains a listing of a demonstration program of SuperBASIC's turtle graphics commands. These commands have the capability for producing some fascinating patterns. Try changing some of the parameters (for MOVE, TURN, and in FOR. . .NEXT loops) in this demonstration program to create different patterns.

Graphs

For those with mathematical or scientific leanings, the final program, in fig.5., is aimed at providing a graph drawing routine, including fitting the best and, whenever the turtle moves, the graphics cursor moves with it. So you can, if you want, mix 'turtle' graphics commands with the LINE commands, and any of the other graphics commands to be covered next month.

When moving the imaginary turtle, PENDOWN must be used if you want a line drawn (in the current INK colour) as the turtle moves. If no line is wanted when moving the turtle, then PENUP

Fig.5. Program to Draw a Straight Line Graph

```
10 REMark  *** Graph Drawing Program ***
20 REMark         by David Nowotnik
30 REMark              May, 1986
40 :
100 INITIALISE
110 MENU
200 :
500 DEFine PROCedure INITIALISE
510 MODE 4
520 WINDOW #1,512,256,0,0
530 PAPER 0: INK 2: CLS
540 WINDOW #1,448,200,32,16
550 WINDOW #2,428,160,42,26
560 WINDOW #0,448,38,32,218
570 PAPER #2,7: INK #2,0
580 PAPER #0,0: INK #0,7
590 OK=0
600 END DEFine INITIALISE
610 :
620 DEFine PROCedure MENU
630 LOCal z,z$
640 REPeat select_1
650   CLS #2: CLS #0
660   CSIZE #2,0,0: PRINT #2, TO 25,"Graph Drawing
Program"
670   PRINT #2\ TO 28,"by David Nowotnik"
680   PRINT #2\\\ TO 14,"Select one of these:-"
690   PRINT #2\\ TO 10,"1. Create new data array"
700   PRINT #2, TO 10,"2. Load data from cartridge"
710   PRINT #2, TO 10,"3. Add more data"
720   PRINT #2, TO 10,"4. Modify data"
730   PRINT #2, TO 10,"5. Save data to cartridge"
740   PRINT #2, TO 10,"6. Draw graph"
750   PRINT #2\\ TO 18,"Press 1 to 6"
760   REPeat select_2
770     z$=INKEY$(-1)
780     IF z$>"0" AND z$<"7" THEN EXIT select_2
790   END REPeat select_2
800   z=z$
810   SELect ON z
820   =1: DATA_ENTRY: OK=1
830   =2: LOAD_ARRAY: OK=1
840   =3: IF OK THEN
850         ADD_DATA: ELSE
860         WARNING
870       END IF
880   =4: IF OK THEN
890         EDIT_DATA: ELSE
900         WARNING
910       END IF
920   =5: IF OK THEN
930         SAVE_ARRAY: ELSE
940         WARNING
950       END IF
960   =6: IF OK THEN
970         GRAPH: ELSE
980         WARNING
990       END IF
1000   END SELect
1010 END REPeat select_1
1020 END DEFine MENU
1030 :
1040 DEFine PROCedure WARNING
1050         PRINT #0; " Create data file first!"
1060         PAUSE 500: CLS #2
1070 END DEFine WARNING
1080 :
1090 DEFine PROCedure DATA_ENTRY
1100 x_data$="": y_data$="": number=0
1110 CLS #2
1120 REPeat data_input
1130   REPeat enter_it
1140     ENTER_VALUES (1)
1150     IF x$="" OR y$="" THEN PRINT #0,"  EXIT - ";
1160     IF SURE THEN                                  ,
1170       IF (x$="" OR y$="") AND number <3 THEN
1180         PRINT #0,"  Not enough data points to exit!
"
1190         PAUSE 500
1200       ELSE : CLS #0: EXIT enter_it
1210       END IF
1220     END IF
1230   END REPeat enter_it
1240   IF x$="" OR y$="" THEN EXIT data_input
1250   number=number+1
1260   x_data$=x_data$&x$&CHR$(0)
1270   y_data$=y_data$&y$&CHR$(0)
1280   PRINT #2,TO 2,"x= ";x$; TO 20;"y= ";y$
1290 END REPeat data_input
1300 PACK
1310 END DEFine DATA_ENTRY
1320 :
1330 DEFine FuNction SURE
1340 PRINT #0\"       Is this correct? (y/n)"
1350 REPeat ask
1360   b$=INKEY$(-1)
1370   IF b$="y" OR b$="Y" THEN RETurn 1
1380   IF b$="n" OR b$="N" THEN RETurn 0
1390 END REPeat ask
1400 END DEFine SURE
```

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```
1410 :
1420 DEFine PROCedure PACK
1430 LOCal x$,y$,nx,ny,no
1440 DIM data_array (number,2)
1450 nx=0: ny=0: no=0
1460 REPeat get_xy
1470   IF number=no THEN EXIT get_xy
1480   x$=""
1490   REPeat extract_x
1500     nx=nx+1: IF x_data$(nx)=CHR$(0) THEN EXIT
extract_x
1510     x$=x$&x_data$(nx)
1520   END REPeat extract_x
1530   y$=""
1540   REPeat extract_y
1550     ny=ny+1: IF y_data$(ny)=CHR$(0) THEN EXIT
extract_y
1560     y$=y$&y_data$(ny)
1570   END REPeat extract_y
1580   no=no+1: data_array (no,1)=x$
1590   data_array (no,2)=y$
1600 END REPeat get_xy
1610 END DEFine PACK
1620 :
1630 DEFine PROCedure UNPACK
1640 LOCal i
1650 x_data$="": y_data$=""
1660 FOR i=1 TO number
1670   x_data$=x_data$&data_array(i,1)&CHR$(0)
1680   y_data$=y_data$&data_array(i,2)&CHR$(0)
1690 END FOR i
1700 END DEFine UNPACK
1710 :
1720 DEFine PROCedure SAVE_ARRAY
1730 LOCal i
1740 CLS #2: PRINT #2\\\\ TO 28,"SAVE DATA ON CARTRIDGE"
1750 NAME
1760 DELETE name$: OPEN_NEW #4,name$
1770 PRINT #4, number
1780 FOR i=1 TO number
1790   PRINT #4, data_array (i,1)
1800   PRINT #4, data_array (i,2)
1810 END FOR i
1820 CLOSE #4
1830 END DEFine SAVE_ARRAY
1840 :
1850 DEFine PROCedure LOAD_ARRAY
1860 LOCal i
1870 CLS #2: PRINT #2\\\\ TO 26,"LOAD DATA FROM
CARTRIDGE"
1880 NAME
1890 OPEN_IN #4, name$
1900 INPUT #4, number
1910 DIM data_array (number,2)
1920 FOR i=1 TO number
1930   INPUT #4,x,y
1940   data_array(i,1)=x
1950   data_array(i,2)=y
1960 END FOR i
1970 CLOSE #4
1980 END DEFine LOAD_ARRAY
1990 :
2000 DEFine PROCedure NAME
2010 LOCal z$
2020 CLS #0
2030 PRINT #0\"  Data cartridge in microdrive 1 or 2?
(1/2) "
2040 REPeat get_drive
2050   z$=INKEY$(-1)
2060   IF z$="1" OR z$="2" THEN EXIT get_drive
2070 END REPeat get_drive
2080 PRINT #0\,"Enter file name on drive ";z$;" "
2090 INPUT #0,name$
2100 name$="mdv"&z$&"_"&name$
2110 END DEFine NAME
2120 :
2130 DEFine PROCedure MIN_MAX
2140 x_min=data_array (1,1): x_max=x_min
2150 y_min=data_array (1,2): y_max=y_min
2160 FOR i=2 TO number
2170   IF data_array (i,1)<x_min THEN x_min=data_array
(i,1)
2180   IF data_array (i,1)>x_max THEN x_max=data_array
(i,1)
2190   IF data_array (i,2)<y_min THEN y_min=data_array
(i,2)
2200   IF data_array (i,2)>y_max THEN y_max=data_array
(i,2)
2210 END FOR i
2220 IF y_min>0 THEN y_min=0
2230 IF x_min>0 THEN x_min=0
2240 END DEFine MIN_MAX
2250 :
2260 DEFine PROCedure ENTER_VALUES (x)
2270 CLS #0
2280 IF x=1 THEN PRINT #0, TO 20,"Just press ENTER to
stop"
2290 REPeat enter_x
2300   PRINT #0,"  Enter the x-coordinate value ";
2310   GET_NUMBER (x): IF valid THEN EXIT enter_x
2320   PRINT #0,"     Invalid entry"
2330 END REPeat enter_x
2340 x$=num$: IF x$="" THEN RETurn
2350 REPeat enter_y
2360   PRINT #0,"  Enter the y-coordinate value ";
2370   GET_NUMBER (x): IF valid THEN EXIT enter_y
2380   PRINT #0,"     Inva.ld entry"
2390 END REPeat enter_y
2400 y$=num$
2410 END DEFine ENTER_VALUES
2420 :
2430 DEFine PROCedure GET_NUMBER (x)
2440 LOCal i
2450 INPUT #0, num$
2460 valid=1
2470 IF x=1 AND num$="" THEN RETurn
2480 dot=0
2490 FOR i=1 TO LEN (num$)
2500   IF num$(i)="." THEN dot=dot+1
2510   IF num$(i)<"0" OR num$(i)>"9" THEN
2520     IF i>1 THEN valid=0
2530     IF i=1 AND NOT (num$(i)="-" OR num$(i)="+")
THEN valid=0
2540   END IF
2550 END FOR i
2560 END DEFine GET_NUMBER
2570 :
2580 DEFine PROCedure ADD_DATA
2590 UNPACK: CLS #2
2600 PRINT #2, TO 28," ADD FURTHER DATA"
2610 FOR i=1 TO number
2620   PRINT #2, TO 2,"x= ";data_array (i,1); TO 20;"y=
";data_array(i,2)
2630 END FOR i
2640 REPeat data_input2
2650   REPeat enter_it2
2660     ENTER_VALUES (1)
2670     IF SURE THEN EXIT enter_it2
2680   END REPeat enter_it2
2690   IF x$="" OR y$="" THEN EXIT data_input2
2700   number=number+1
2710   x_data$=x_data$&x$&CHR$(0)
2720   y_data$=y_data$&y$&CHR$(0)
2730   PRINT #2,TO 2,"x= ";x$; TO 20;"y= ";y$
2740 END REPeat data_input2
2750 PACK
2760 END DEFine ADD_DATA
2770 :
2780 DEFine PROCedure EDIT_DATA
2790 LOCal j,h,k,i,z$,z
2800 j=0
2810 REPeat edit_1
2820   h=j*20+1: k=j*20+20
2830   IF h>number THEN EXIT edit_1
2840   IF k>number THEN k=number
2850   CLS #2: j=j+1
2860   FOR i=h TO k
2870     PRINT #2, TO 2,i, TO 8,"x= "; data_array (i,1),
TO 20, "y= ";data_array(i,2)
2880   END FOR i
2890   CLS #0: PRINT #0, "  Edit one of these data
items? (y/n)"
2900   REPeat edit_2
2910     z$=INKEY$(-1)
2920     IF z$='y' OR z$='Y' THEN EXIT edit_2
2930     IF z$='n' OR z$='N' THEN EXIT edit_2
2940   END REPeat edit_2
2950   IF z$='y' OR z$="Y" THEN
2960     PRINT #0\"  Which item (";h;" to ";k;")";
2970     REPeat edit_3
2980       GET_NUMBER (0)
2990       z=num$: z= INT(z)
3000       IF z>=h AND z<=k THEN EXIT edit_3
3010       PRINT #0\"  Out of range - try again!"
3020     END REPeat edit_3
3030     INK #2,2: PAPER #2,0
3040     AT #2,z-h,2: PRINT #2,z
3050     INK #2,0: PAPER #2,7
3060     ENTER_VALUES (0)
3070     data_array (z,1)=x$
3080     data_array (z,2)=y$: CLS #2
3090     FOR i=h TO k
3100       PRINT #2, TO 2,i, TO 8, data_array (i,1), TO
20, data_array(i,2)
3110     END FOR i
3120     PAUSE 200
```

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```
3130   ELSE : EXIT edit_1
3140   END IF
3150 END REPeat edit_1
3160 END DEFine EDIT_DATA
3170 :
3180 DEFine PROCedure GRAPH
3190 MIN_MAX
3200 CLS
3210 factor= (x_max-x_min)*1,65/(y_max-y_min)
3220 sc=(y_max-y_min)*1.25
3230 SCALE sc,-(.2-x_min)*factor,-(.2-y_min)
3240 LINE x_min*factor,0 TO x_max*factor,0
3250 LINE 0,y_min TO 0,y_max
3260 INK 5
3270 FOR i=1 TO number
3280   x=data_array (i,1): y=data_array (i,2)
3290   POINT x*factor,y
3300 END FOR i
3310 CLS #0
3320 PRINT #0,"  Y axis from ";y_min;" to ";y_max;", X
axis from ";x_min;" to ";x_max
3330 INK 2
3340 CALC
3350 z$=INKEY$(-1)
3360 CLS
3370 END DEFine GRAPH
3380 :
3390 DEFine PROCedure CALC
3400 LOCal i
3410 x_total=0: y_total=0
3420 x2_total=0: y2_total=0
3430 xy_total=0
3440 FOR i=1 TO number
3450   x_total=x_total+data_array(i,1)
3460   y_total=y_total+data_array(i,2)
3470   x2_total=x2_total+data_array(i,1)*data_array (i,1)
3480   y2_total=y2_total+data_array(i,2)*data_array (i,2)
3490   xy_total=xy_total+data_array(i,1)*data_array (i,2)
3500 END FOR i
3510
slope=(xy_total-x_total*y_total/number)/(x2_total-x_total*x_tot-
al/number)
3520 x_mean=x_total/number
3530 y_mean=y_total/number
3540 y_int=y_mean-slope*x_mean
3550 x_var=SQRT(x2_total/number-x_mean*x_mean)
3560 y_var=SQRT(y2_total/number-y_mean*y_mean)
3570 regression=slope*x_var/y_var
3580 PRINT #0\" Slope= ";slope;": y-intercept= ";y_int
3590 PRINT #0," Correlation coefficent = ";regression
3600 y_low=y_int+x_min*slope
3610 y_high=y_int+x_max*slope
3620 INK 7
3630 LINE x_min*factor,y_low TO x_max*factor,y_high
3640 END DEFine CALC
```

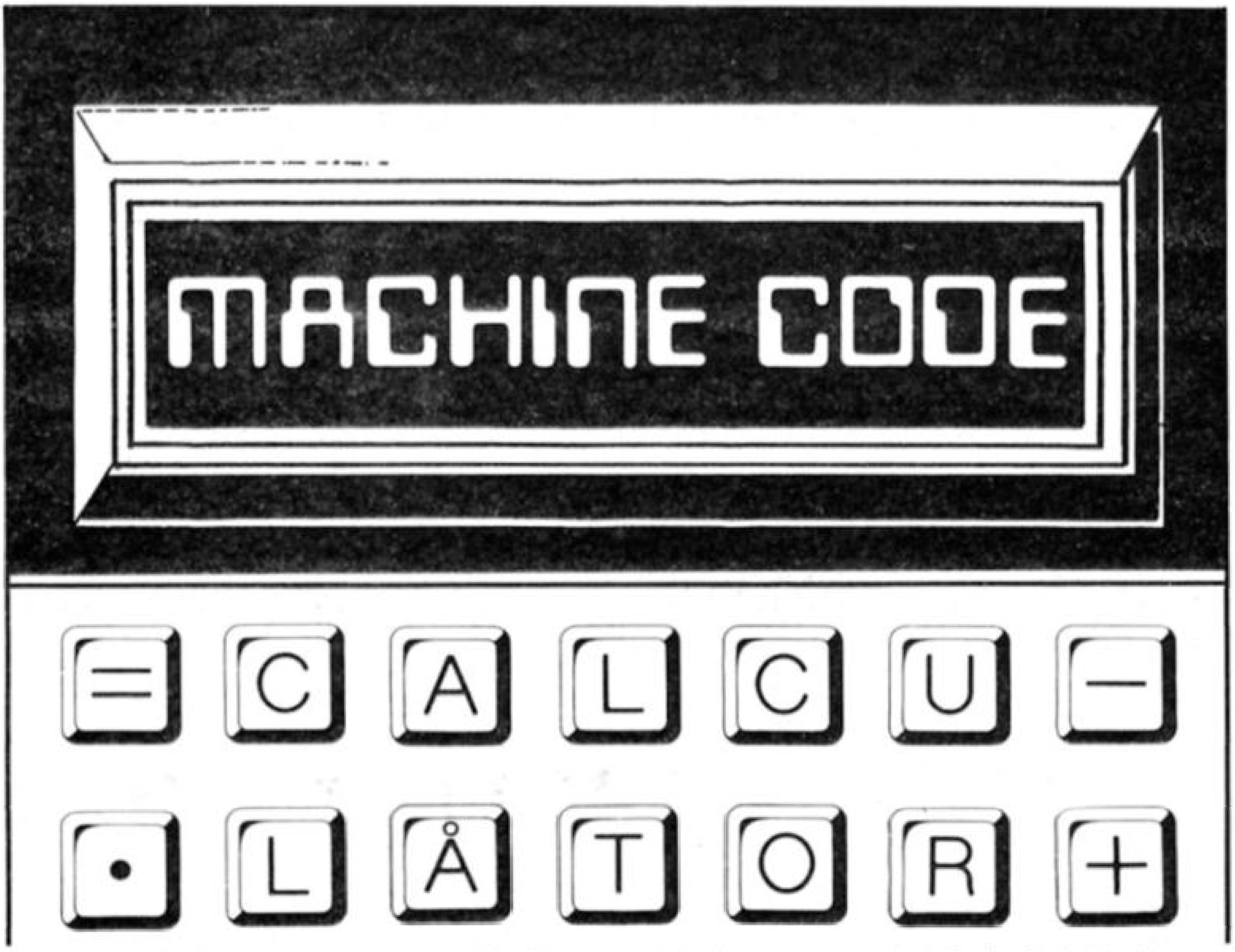
straight line to data by linear regression analysis. Don't worry if that sounds a little heavy. It's a technique for determining trends, to allow some attempt to predict what might happen in the future. The program uses SCALE and LINE commands to create the graph; it also has a large number of data entry, data checking and modifying procedures for anyone who might be thinking of writing a number crunching program. The whole program is menu-driven, and on screen messages should make it easy to follow.

Once you have entered and SAVEd the listing, RUN the program. This gives you a menu of six options. Selecting 1 allows you to enter data as pairs of x and y-coordinates. At least three pairs of coordinates must be entered, and then press ENTER without data to exit the data entry routine. After entering each pair of coordinates, you are asked to confirm the data before it is stored in RAM.

Once data has been entered, you can save it on microdrive, alter any coordinate values, add more values, or load previously saved data from tape. All these options combine to provide a powerful data storage system. The data is used in option six to draw a graph on the screen. The length and position of the x and y-axes are selected automatically. On the screen, you'll see the axes drawn in red, the data points plotted in green, and the straight line drawn in white. Figures at the bottom of the screen give you the ranges of the x and y-axes, the intercept of the best-fit line on the y-axis, the slope of the line, and something called the correlation coefficient. For non-mathematicians, this is a number, ranging between −1 and +1 which indicates how close the data can be represented by a straight line graph. Correlation coefficients close to +/− 1 show a good fit of the data to the straight line, whereas values close to 0 show little or no correlation between the x and y-coordinates.

The procedures in this program most relevant to drawing of line graphics are the last two, GRAPH and CALC. These do all the calculations to find SCALE and draw the graph with LINE.

That's just about all for straight line graphics. Next month we'll be taking a look at SuperBASIC's commands for producing arcs, circles, and ellipses, and how to fill in areas with colours, and mix text with graphics. Everything you need for full colour displays.



Toni Baker takes a calculated delve into the Spectrum ROM.

This is the first part of a new five part series on the use of the Spectrum's Machine Code Calculator. This is a feature built into the ROM of the Spectrum, and it enables you to perform complicated mathematics entirely in machine code. In fact, it is true to say that the Machine Code Calculator can do many things which you simply cannot do in BASIC.

It has always been a disadvantage of machine code that the instruction set does not allow for arithmetic other than addition and subtraction of small integers. With the Spectrum there is also a subroutine in the ROM you can use (CALL HL=HL*DE) at address 30A9 which does multiplication of small integers and corrupts none of the registers except A. On exit the carry is reset normally, but set if the result is too big to fit into HL. But even so, there is no division, let alone more complicated stuff like square roots and random numbers.

In fact, it is because machine code is normally restricted to working on small integers that higher level arithmetic is not possible. You cannot divide one by two, because there is no register which can hold the value one-half. The Spectrum Calculator neatly avoids this problem, by representing all numbers in *five* bytes, rather than two. Before we examine the operation of the calculator in detail, let's study how this five byte representation actually works. . .

Positive Integers Between 0 and 65535

If the high byte of an integer is 'pp', and the low byte of an integer is 'qq', then the five byte form is '00 00 qq pp 00'.

Negative Integers Between −1 and −65535

Writing −1 as FFFF, −2 as FFFE, and so on, if the high byte of such a negative integer is 'pp' and the low byte is 'qq' then the five byte form is '00 FF qq pp 00'.

All Other Numbers

Before I describe the general five byte format for numbers, I should point out that the Spectrum can only handle numbers between −1.7014118E+38 and +1.7014118E+38. Numbers outside this range cannot be handled by the Spectrum and generally result in report code "6, Number too big" if they occur. To store numbers in five bytes involves an ingenious little trick. The trick is to keep dividing the number by two until it gets small enough to handle, and to count how many times you needed to divide. This way you can store the main part of the number (after it's divided) in four bytes, and the number of divides in one more byte. We can then reconstruct the original number at will by multiplying it by two the given number of times. Clever isn't it?

How it works is this: Start off with a number. Keep dividing it by two until all you have left is a fraction between −1 and +1. The number of times you needed to divide is called the EXPONENT, and what's left of the number is called the MANTISSA. The exponent takes one byte, and the mantissa takes four. Hence we have five bytes altogether.

Note that if the original number is a fraction to begin with then you obviously don't need to divide it by two any more. Instead you multiply by two over and over again until the number is greater than or equal to one-half (or less than or equal to minus-one-half). In this case the exponent may be zero or negative.

It is impossible to store the number zero in this manner, since however many times you multiply or divide zero by two you'll always get zero. For this reason, the number zero is

Figure One

```
10 DIM B(5)
20 INPUT X: PRINT X
30 IF ABS X>65535 THEN GO
TO 120
40 IF X<>INT X THEN GO TO 120
50 LET B(1) = 0
60 LET B(2) = 255*(X<0)
70 IF B(2) = 255 THEN LET X = X
+ 65536
80 LET B(4) = INT (X/256)
90 LET B(3) = X-256*B(4)
100 LET B(5) = 0
110 GO TO 310
120 LET EXPONENT = 1 + INT (LN
ABS X /LN 2)
130 IF EXPONENT< -127 THEN LET
X = 0:GO TO 50
140 LET MANTISSA=ABS X /2↑
EXPONENT
150 LET B(1) = EXPONENT + 128
160 LET A = MANTISSA
170 FOR I = 2 TO 5
180 LET A = 256*A
190 LET B(I) = INT A
200 LET A = A - B(I)
210 NEXT I
220 LET C = A> = .5
230 FOR I = 5 TO 2 STEP - 1
240 LET B(I) = B(I)+C
250 LET C = B(I) = 256
260 IF C THEN LET B(I) = 0
270 NEXT I
280 IF C THEN LET B(2) = 128
290 IF C THEN LET B(1) = B(1) + 1
300 IF X > 0 THEN LET B(2) = B(2)
- 128
310 FOR I = 1 TO 5
320 PRINT B(I);'space';
330 NEXT I
340 PRINT "
350 GO TO 20
```

always stored in five bytes as a small integer. Zero in five byte form is invariably '00 00 00 00 00'.

The five byte form of such a number is now quite easy to explain. The first byte is the exponent plus 128d (ie in hex with bit seven complemented). The remaining four bytes store ABS of the mantissa (which is always at least one-half, and less than one, so there is an imaginary hexadecimal point at the left of the mantissa). Finally, bit seven of the second byte is made to contain one if the number was negative; zero if the number was positive.

You can see this algorithm working in the program of Figure One. Lines 30-40 decide whether the number is a small integer or a floating point number. Lines 50 to 110 deal with the simple case of a small integer. Numbers between −1.469367E−39 and +1.469367E−39 are too small for the Spectrum to deal with, and so are treated as zero — lines 120-130 deal with this case and calculate the exponent. Line 140 calculates the mantissa. Line 150 decides the first of the five bytes, and lines 160-210 initialise the remaining four. Lines 220-290 round the mantissa up if necessary, and line 300 resets bit seven of byte two if the number was positive. The rest of the program just prints the result.

Figure Two illustrates the reverse process of turning a five byte form back to a decimal number. Line 30 decides whether the number is a small integer or a floating point number. Lines 40-60 deal with small integers, wheras lines 70-120 deal with floating point numbers. In fact this algorithm, because it is shorter and simpler, is considerably easier to visualise than that of Figure One.

Strings

Strings can also be represented in a five byte form, but the text of the string must be stored elsewhere. For instance, to represent the string "Stonehenge" you must first of all store the ten bytes of the string sequentially somewhere in memory (usually in the workspace, but you could equally well use space above RAMTOP). Then, if the address of the first character (of the "S" in this case) has high byte 'dd' and low byte 'ee', and if the length of the string (in this case ten) has high byte 'bb' and low byte 'cc', then the five byte form for this string is '00 ee dd cc bb'.

The Calculator Stack

The Calculator Stack is where all calculator operations take place. It is the area of memory immediately above the workspace, and below spare RAM. It is a stack which works very much like the ordinary machine stack, except that it grows upwards instead of downwards, and that each item on the stack is five bytes long, not two. The system variable STKBOT points to the base of the stack — the first byte of RAM within the calculator stack. The system variable STKEND points one byte beyond the end of this stack — to the first byte of spare RAM. If the stack is empty then (STKBOT) will equal (STKEND). The topmost item on the stack will therefore occupy addresses (STKEND)−5 to (STKEND)−1.

Use of the calculator stack is essential if the awesome power of the calculator itself is to be tapped. Essentially you merely have to perform three tasks: to push numbers and strings onto the calculator stack; to manipulate this stack (eg to perform arithmetic); and to pop the results from the stack. In this article I shall explain how to push and pop things, and in the subsequent four articles I shall explain how to use the calculator to manipulate the stack.

Figure Two

```
10 INPUT A;" ";E;" ";D;" ";C;" ";B
20 PRINT A;" ";E;" ";D;" ";C;" ";B
30 IF A   0 THEN GO TO 70
40 LET NUMBER = 256*C + D
50 IF E = 255 THEN LET NUMBER =
NUMBER - 65536
60 GO TO 130
70 LET EXPONENT = A - 128
80 LET SIGN = -1
90 IF E<128 THEN LET SIGN = 1
100 IF E<128 THEN LET E = E
+ 128
110 LET MANTISSA = E/256 +
D/65536 + C/16777216 +
B/4294967296
120 LET NUMBER = SIGN * 2↑
EXPONENT * MANTISSA
130 PRINT NUMBER "
140 GO TO 10
```

Pushing Things Onto The Stack

Integers Between 0 and +255d
Load the A register with the required integer, then CALL STACK_A (at address 2D28).

Integers Between 0 and +65535d
Load the BC register pair with the required number, then CALL STACK_BC (address 2D2B).

All Other Numbers
Convert the number to five byte form by the procedure described earlier, and store in the register quintuplet AEDCB (with A containing the exponent and EDCB containing the mantissa high byte first), then CALL STACK_AEDCB (address 2AB6).

The Empty String
Load the A register with zero, then CALL STACK_A (address 2D28).

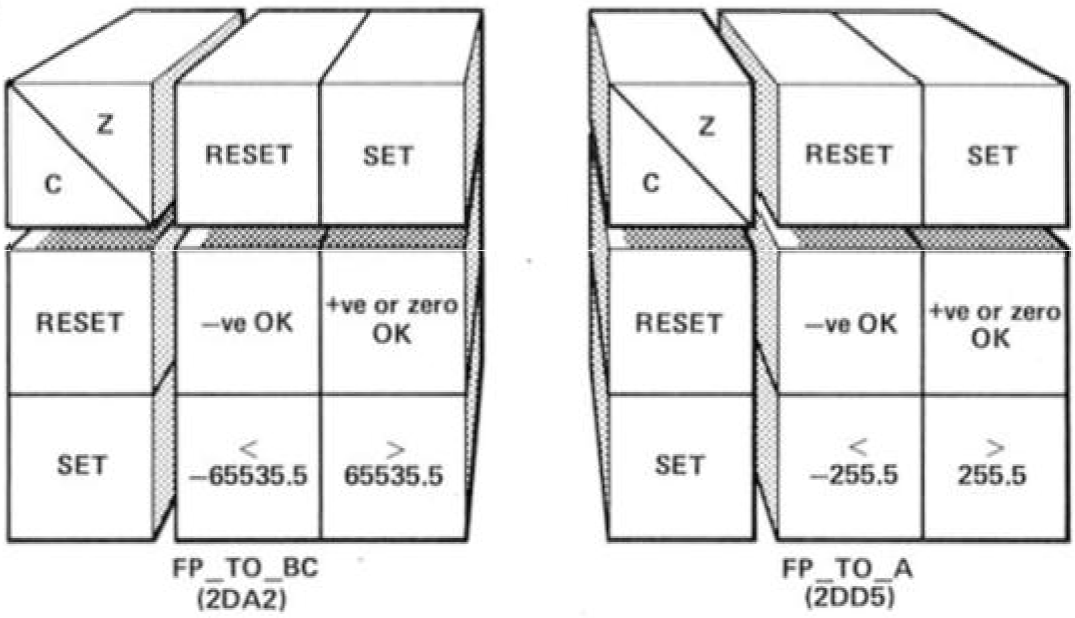
All Other Strings
Load DE with the address of the first character of the string, and BC with the number of bytes in that string, then CALL STACK_AEDCB (address 2AB6). Note that the value of the first byte (from the A reg) is irrelevant.

Popping Things From The Stack

Strings
CALL FP_TO_AEDCB (at address 2BF1). DE will now contain the address of the string, and BC will contain the length.

Floating Point Numbers
CALL FP_TO_AEDCB (at address 2BF1). The A register will contain the exponent byte (or 00 if this is a small integer) and EDCB will contain the sign bit

Figure Three



and the mantissa. If the A register is zero then the number is a small integer with C containing the high byte and B the low; E will then contain the sign byte.

Integers Between −65535d and +65535d

CALL FP_TO_BC (at address 2DA2). If the number was greater than or equal to 65535.5 (or less than or equal to −65535.5) then the carry flag is set and BC will contain rubbish. Otherwise ABS of the number is rounded up or down to the nearest integer and stored in BC. The carry flag is reset. If the number was negative then the zero flag will be reset, otherwise it will be set. See Figure Three.

Integers Between −255d and +255d

CALL FP_TO_A (address 2DD5). If the number was greater than or equal to 255.5 (or less than or equal to −255.5) then the carry flag is set and A will contain rubbish. Otherwise ABS of the number is rounded up or down to the nearest integer and stored in the A reg. The carry flag is reset. If the number was negative then the zero flag will be reset, otherwise it will be set. See Figure Three.

Manipulating The Calculator

The key to arithmetic on the calculator is a magic little machine code instruction called RST 28 — To Be Continued...

We have a change this month from our usual "serious" ZX81 article and play with dice.

I felt like writing something a little different this month and so I sat down and produced these routines for simulating the rolling of dice.

You can choose to roll and display from one to five dice and they will be spaced evenly along the top of the screen. I am sure that you will find a use for this routine, from the simple 21 type game to the more advanced Yahtzee game, the exercise of programming that kind of logic will really stretch you!

Another application could be for resolving combat routines in adventure games or adding a random factor for strategy programs, and then again I'm sure some of you will devise a use for it which I wouldn't have dreamed of .....

As it's not really part of our giant utility program I have used a few specific addresses and it should run where I have written it. It can be changed fairly easily if you are familiar with machine code.

Enter the program as shown and RUN it, the line 1 REM must be included as it will hold the machine code and should hold 235 dots or characters. Now delete the loader part of the program **BUT NOT LINE 1**, and you can enter program 2. This is a demo of how to roll the dice. I have chosen three, but the method is as follows.

1. **POKE 16514** the number of dice to roll, 1 to 5.
2. **CALL** the routine at address 16579 — DO NOT use RAND or the results will tend to be rather similar each time.
3. Get the values for the dice by PEEKing addresses 16515/9 for dice 1 to 5 respectively.

And now all you've got to do is write your game ......

```
PROGRAM 1
   1 REM .......................
.............................
.............................
.............................
.............................
.............................
.............................
.............................
.............................
  10 LET A$="808080809780808080808
08097808080978080808097809780978
08097809780808097809797809780978
0978097978097978097978097"
  20 LET A$=A$+"2188403A8240FE01
2004360F1838FE022007360923361518
2DFE03200A360923360F233615181FFE
04200D360623360C233612233618180E
360323360923360F23361523361B"
  30 LET A$=A$+"21834047E52A3240
545D292919292929192232407CD60630
FCC6E1772310E4218740E5218340E5E1
3A8240FE002002C1C93D328240461184
400E09130D20FC10F823C103C5E50A2A
0C404F0600090603C506031A77132310
FA011E0009C110F018C5"
  40 FOR I=16525 TO 16747
  50 POKE I,16*CODE A$+CODE A$(2
)-476
  60 LET A$=A$(3 TO )
  70 NEXT I
  80 REM THERE IS NO ERROR CHECK
SO MAKE SURE THAT THE A$ CODE IN
LINES 10 TO 30 IS CORRECT. SAVE
BEFORE RUNNING - JUST IN CASE -
```

Program 2 - demo

```
   1 REM PRODUCED BY PROGRAM 1
   8 REM * ROLLING 3 DIE DEMO *
  10 LET N=3
  20 FOR I=1 TO 15
  30 POKE 16514,N
  40 LET D=USR 16579
  50 NEXT I
  60 FOR I=1 TO N
  70 PRINT AT 4,I*6+3;PEEK (1651
4+I)
  80 NEXT I
  90 REM CHANGE N TO VALUES 1 TO
 5 TO SEE THE WAY THE PROGRAM
PRINTS OTHER COMBINATIONS.
```

On second thoughts

I am aware that there are many who follow this series avidly and who will write to us angrily if I omit a routine for the big REM project, so, just for them, I include a short but interesting routine (fig 3) which will draw a border around the screen.

In line with the usual policy it can be located anywhere in the REM. I'll leave the actual address up to you, I suggest one following the last code you entered, or for new readers 16514.

New readers can simply replace lines 10 to 30 in program 1 with a single line 10 as given, and you can start the program with RAND USR 16525. You can change the border character by POKING the character value you want to use into the location of your start address plus one, ie. if at 16525 then poke 16525 with the code.

Program 3. A routine for the big REM project. Add to your usual loader and change the start address to suit.

```
  10 LET A$="3E802A0C40230100000
9E5012000C5772310FC010014ED43B64
0D1E101210009E5D5771B1977ED4BB64
010EAC1E111210019772310FCC9"
```

UTILITIES

Designer/Character Designer
GAP Software
£12.50

Now I must admit it, I also use a BBC and one of my most useful programs on that machine is Fleet Street Editor. Why am I telling you this? Because I have been waiting for some time for the Spectrum version and it has not been forthcoming.

GAP Software have produced a program which, though limited, will fill the gap (no pun intended) until they do.

It is a graphics program intended as an A4 page poster designer. The program is cleverly programmed so that up to 52 screen lines are printed rather than a single expanded screen of 22 lines, this gives a full, proportional setting on A4 paper.

Printer routines are provided by the program and resident routines as used by the Kempston and ZXLprint 3 interfaces are recognised and utilised if you wish.

Each of the two programs are self contained and can be purchased separately if required for £8.95 and £4.50 respectively, and both have built in routines to transfer themselves to microdrive if so desired.

Designer

This is the program that produces the posters, the quality will depend on you. There is one serious problem in that all graphics have to be created via UDGs. Characters and graphics are dealt with at character square size and this can tend to produce chunky, rectangular results.

However, it is not all bad as, if you have the time and interest, then by putting several UDGs together you can create quite complex graphics. This is more laborious than using a freehand artwork system but just as effective in the final result.

Actually there are 100 textures, patterns and designs built in and ready for you to use, plus three text fonts, certainly enough to give you some inspiration.

Character Designer

This program is meant to compliment the Designer program in that it allows you to create more UDGs and text fonts for use with it, 10 new fonts and two sets of UDGs are already built into the program.

It can, of course, be used to create UDGs for other programs and for usage other than in Designer.

Both programs make extensive use of menus and are well written and prompted, they are a little bit fiddly to use and the manuals, both produced by Tasword 3 on a small printer yet perfectly legible, seem to be based on the Masterfile manuals in presentation.

I liked it, possibly because I am a sucker for programs which demonstrate to aunt Edna that the computer can DO something, but also because I could never produce good posters freehand.

If creative posters, magazines or artwork, albeit simple, is an area which you want to delve into then try these programs.



Code Slicer 2
Foraits Software
£5.50

The last I heard from this company was their Kwickload program and they seem too intent on continuing to supply specialist utility software.

I remember being incensed by the difficulty of transferring software to the microdrive system and indeed to many of the disk and fast storage media which have passed through my grubby little hands.

Foraits have produced this set of utilities to help determined users to make such transfers. I gave up ages ago!

It is no good buying this program and thinking that all your problems are over, in fact most of the work still has to be done by you and often by trial and error. What this suite of programs and the accompanying booklet does do is provide suggestions and utilities to make the job a little easier.

So armed with CS2 and a copy of a program I deemed "not too difficult" to transfer I got out the microdrive and IF1 and sat down. Four hours later, after much sweat and expletives, I had effected a working copy on the microdrive.

I must admit that I probably couldn't have done it without CS2, and I must also state that inexperienced programmers may well find it beyond them. I must finally admit that I wouldn't really have bothered anyway if I hadn't needed to try out CS2 and probably won't use it again.

So what can I say? CS2 is very useful to the determined, experienced programmer who wants to transfer his copy of "Zap the Aliens" to microdrive/disk at all costs but beyond that its applications are limited.

Realms of Interaction

Part 3: Alan Davis' adventure writing series continues, with Merlin and co. starting to pick up objects.

I want to begin this month by reminding you of a few (immortal?) words from the first article in the series: "However we approach it, we must create the illusion that they (the independent characters) are behaving in a purposeful way." Note well the word "illusion" here — because of course the whole business of creating independent characters is really a kind of sleight-of-hand on the part of the programmer. The key to success in this doesn't necessarily lie in the use of incredibly sophisticated artificial intelligence techniques, but rather in the programmer's ability to capture the imagination and sympathy of the player.

What we need to aim for is a program which prompts the player to believe that there is more going on "beneath the surface" than meets the eye, and there are several ways we can approach this. For a start, each character should at least seem



to be aware of any other characters he encounters — perhaps by chatting away to one of them occasionally, as might happen in real life. In this way we can periodically remind the player that the goings-on in our imaginary world are not wholly dependent on his participation; that as far as the inhabitants of the world are concerned he's just another character, neither more nor less important than the rest.

Another thing we can do is to make our characters seem aware of objects in their surroundings. For example, they should be capable of picking up objects or discarding them of their own accord. Perhaps they might mention their possessions in conversation, in a sensible way. And if we can arrange for something a little out of the ordinary to happen now and then, well so much the better.

Character building

Now if we're going to attempt this sort of thing, our program needs to have rapid access to three essential kinds of information. It must be possible to find out, at any time: (a) which characters are present at the current location; (b) which objects are present; and (c) which objects are currently being carried by any given character. Of course you could do all this in BASIC without any difficulty. But unless you're willing to write an adventure involving only a very small number of characters and objects, the repeated use of all the necessary program loops will lengthen the response time of your game to a desperately ponderous degree. The obvious answer is to add just a dash of machine code to deal with these three specific routines — which brings us to the meat of this month's ramblings.

If you look back at last month's article, you'll see that in our miniature world there are six characters (if we include Merlin — the player-controlled character) and eight objects, whose names are stored in sequence in two string arrays. Of course, in a full-blown adventure you'd want more than this; it's the basic principles of the business that we're involved with at present, and the actual number of objects etc. is irrelevant. Our first job is to decide on some method of storing position information for each one of these. This means storing two numbers for each character or object, corresponding to the BASIC variables, io and jo, that we used last month to define Merlin's position on the map. We'll call these i and j respectively. Because all our scanning of these data lists is going to be done from machine code, the sensible thing to do is to store them as a sequence of bytes above RAMTOP.

M/C routines

Listing 1 is the assembly language program which provides us with the three routines we need. The position data for the characters begins at the label FKLC (64831). The first two bytes give Merlin's map coordinates (i at 64831 followed by j at 64832) and of course we'll need to update these from BASIC as you move Merlin about when the program is running. The next two bytes hold Timbril's map coordinates, and so on. Incidentally, the DEFS 20 instruction simply reserves extra space so that, if you wish, you can add more characters of your own later.

Position data for the objects starts at label OBLC (64863) and is stored in the same way as for the characters apart from one important difference. You'll notice that some of the numbers here are greater than 100. These are objects which are being carried by one of the characters. When an object is being carried, we arrange for its i coordinate, the first byte of the pair, to be 100 + (numeric code of character holding it). So an object carried by Merlin has an i coordinate of 101; one carried by Timbrill has i=102 and so on. Again, I've left some spare bytes for you to add further objects if you wish.

Right, now to the routines proper. Listing 1 provides three routines which I've called WHO, WHAT, and LIST, whose USR call addresses are 64720, 64782, and 64900 respectively. Their jobs are as follows:

WHO — this scans through the position data for the characters to find which ones are present at Merlin's current location.

WHAT — this does the same for the objects.

LIST — this scans through the object position data and finds the objects carried by the character whose code is held in the byte at address 64945 (labelled CHAR in Listing 1).

Information

So, how do we extract this information from within our BASIC program? Simple. Suppose we want to know about the characters present. If we call the routine using **LET m=USR 64720,** then the variable m will hold the number of characters present, and the numeric codes of these characters will be found in the bytes from 64811 onwards (labelled PRES in Listing 1). All the other routines work in the same way, except that for the LIST routine you must first **POKE 64945** (CHAR) with the code of the character involved. Thus, **POKE 64945,1: LET m=USR 64900** will give us Merlin's inventory as a sequence of "m" codes stored in successive addresses starting at 64811 (PRES).

If you decide eventually to add a few characters or objects, then you'll need to change the loop counter for each of the three routines, in lines 40, 380, and 900 of Listing 1 (though it's probably best to wait until you have the next two articles before trying this). For the three people over there in the corner who still don't have an assembler program, Listing 2 gives a BASIC program which will POKE the code into memory, check it, and save it to tape.

Now we have our routines, what next? The most exciting bit comes next month, but we can certainly find a use for them here and now. Load in last month's auto-running BASIC module and BREAK. Then load in the new bytes from this month and add to the program the lines of BASIC in Listing 3. Line 9998 replaces an existing line so that you can save the complete updated program and bytes by typing **GOTO 9998.**

To assist the intelligibility of the program, the various addresses relating to the machine code are assigned to named variables in lines 8010/8020. (It's much more convenient to bash in a line like **POKE char,1: LET m=USR** list than to have to keep looking up the numbers.) Line 50 defines a new function which enables the program to string together a list of objects in a coherent way before printing to the screen. Lines 260/270 will enable you to take Merlin's inventory by pressing the "I" key, and demonstrate the use of the LIST routine. Lines 1060/1100 add a list of characters present to the location descriptions, and demonstrate the use of the WHO routine. Note also the two POKEs which update the position data for Merlin as you move him between locations. Finally, lines 1110/1160 add a list of the objects present to the location descriptions, demonstrating the WHAT routine in action.

Once you've typed everything in and saved it, type GOTO 8010 to get the program running (*not* RUN!). If all is well, Merlin should be carrying a staff when you give the "I" key a prod. And as you move him about he should encounter all the other characters and an assortment of objects lying around here and there.

Of course the other chaps still won't do anything, but now we have everything we need. The stage is set, the cast assembled, and next month the mayhem begins...

Listing 1

```
*HISOFT GENS3M2 ASSEMBLER*
      ZX SPECTRUM

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Pass 1 errors: 00

          10 *C-
FCD0      20          ORG   64720
FCD0      30 WHO      CALL  INIT
FCD3      40          LD    B,6
FCD5      50          LD    HL,FKLC-1
FCD8      60 LOOP     LD    A,(CODE)
FCDB      70          INC   A
FCDC      80          LD    (CODE),A
FCDF      90          INC   HL
FCE0     100          PUSH  DE
FCE1     110          PUSH  HL
FCE2     120          LD    A,(HL)
FCE3     130          CP    E
FCE4     140          CALL  Z,FND1
FCE7     150          POP   HL
FCE8     160          POP   DE
FCE9     170          INC   HL
FCEA     180          DJNZ  LOOP
FCEC     190          LD    BC,(NO)
FCF0     200          LD    B,0
FCF2     210          RET
FCF3     220 FND1     INC   HL
FCF4     230          LD    A,(HL)
FCF5     240          CP    D
FCF6     250          CALL  Z,FND2
FCF9     260          RET
FCFA     270 FND2     LD    HL,PRES
FCFD     280          LD    DE,(NO)
FD01     290          LD    D,0
FD03     300          ADD   HL,DE
FD04     310          LD    A,(CODE)
FD07     320          LD    (HL),A
FD08     330          LD    A,E
FD09     340          INC   A
FD0A     350          LD    (NO),A
FD0D     360          RET
FD0E     370 WHAT     CALL  INIT
FD11     380          LD    B,8
FD13     390          LD    HL,OBLC-1
FD16     400          JP    LOOP
FD19     410 INIT     XOR   A
FD1A     420          LD    (NO),A
FD1D     430          LD    (CODE),A
FD20     440          LD    HL,FKLC
FD23     450          LD    A,(HL)
FD24     460          LD    E,A
FD25     470          INC   HL
FD26     480          LD    A,(HL)
FD27     490          LD    D,A
FD28     500          RET
FD29     510 CODE     DEFB  0
FD2A     520 NO       DEFB  0
FD2B     530 PRES     DEFS  20
FD3F     540 FKLC     DEFB  2
FD40     550          DEFB  1
FD41     560          DEFB  2
FD42     570          DEFB  1
FD43     580          DEFB  3
FD44     590          DEFB  2
FD45     600          DEFB  4
FD46     610          DEFB  5
FD47     620          DEFB  5
FD48     630          DEFB  3
FD49     640          DEFB  3
FD4A     650          DEFB  2
FD4B     660          DEFS  20
FD5F     670 OBLC     DEFB  101
FD60     680          DEFB  0
FD61     690          DEFB  103
FD62     700          DEFB  0
FD63     710          DEFB  104
FD64     720          DEFB  0
FD65     730          DEFB  2
FD66     740          DEFB  1
FD67     750          DEFB  3
FD68     760          DEFB  4
FD69     770          DEFB  5
FD6A     780          DEFB  1
FD6B     790          DEFB  106
FD6C     800          DEFB  0
FD6D     810          DEFB  1
FD6E     820          DEFB  1
FD84     830          ORG   64900
FD84     840 LIST     XOR   A
FD85     850          LD    (NO),A
FD88     860          LD    (CODE),A
FD8B     870          LD    A,(CHAR)
FD8E     880          ADD   A,100
FD90     890          LD    E,A
FD91     900          LD    B,8
FD93     910          LD    HL,OBLC-2
FD96     920 LOOP2    LD    A,(CODE)
FD99     930          INC   A
FD9A     940          LD    (CODE),A
FD9D     950          INC   HL
FD9E     960          INC   HL
FD9F     970          PUSH  DE
FDA0     980          PUSH  HL
FDA1     990          LD    A,(HL)
FDA2    1000          CP    E
FDA3    1010          CALL  Z,FND2
FDA6    1020          POP   HL
FDA7    1030          POP   DE
FDA8    1040          DJNZ  LOOP2
FDAA    1050          LD    BC,(NO)
FDAE    1060          LD    B,0
FDB0    1070          RET
FDB1    1080 CHAR     DEFB  0

Pass 2 errors: 00

CHAR     FDB1     CODE     FD29
FKLC     FD3F     FND1     FCF3
FND2     FCFA     INIT     FD19
LIST     FD84     LOOP     FCD8
LOOP2    FD96     NO       FD2A
OBLC     FD5F     PRES     FD2B
WHAT     FD0E     WHO      FCD0

Table used:    165  from    258
```

Listing 2

```
 10 REM *** Machine code loader
 11 REM
 20 CLEAR 64719: LET s=0
 30 LET n1=64720: LET n2=64808:
GO SUB 90
 40 LET n1=64830: LET n2=64842:
GO SUB 90
 50 LET n1=64860: LET n2=64878:
GO SUB 90
 60 LET n1=64900: LET n2=64944:
GO SUB 90
 70 IF s<>17889 THEN PRINT "Err
or!!": STOP
 80 SAVE "what"CODE 64720,226:
STOP
 90 FOR i=n1 TO n2: READ x: POK
E i,x: LET s=s+x: NEXT i: RETURN

100 DATA 205,25,253,6,6,33,62,2
53,58,41
110 DATA 253,60,50,41,253,35,21
3,229,126,187
120 DATA 204,243,252,225,209,35
,16,236,237,75
130 DATA 42,253,6,0,201,35,126,
186,204,250
140 DATA 252,201,33,43,253,237,
91,42,253,22
150 DATA 0,25,58,41,253,119,123
,60,50,42
160 DATA 253,201,205,25,253,6,8
,33,94,253
170 DATA 195,216,252,175,50,42,
253,50,41,253
180 DATA 33,63,253,126,95,35,12
6,87,201
210 DATA 0,2,1,2,1,3,2,4,5,5,3,
3,2
220 DATA 0,0,0,101,0,103,0,104,
0,2
230 DATA 1,3,4,5,1,106,0,1,1
240 DATA 175,50,42,253,50,41,25
3,58,177,253
250 DATA 198,100,95,6,8,33,93,2
53,58,41
260 DATA 253,60,50,41,253,35,35
,213,229,126
270 DATA 187,204,250,252,225,20
9,16,236,237,75
280 DATA 42,253,6,0,201
```

Listing 3

```
  50 DEF FN g$(x)=FN a$(PEEK x)+
(", " AND m>1 AND x<>pres+m-1)+(
"and " AND m>1 AND x=pres+m-2)
 257 REM
 258 REM *** Inventory
 259 REM
 260 IF v=6 THEN LET z$="Merlin
is carrying ": POKE char,1: LET
m=USR list: IF NOT m THEN LET z$
=z$+"nothing": GO SUB 100: GO TO
 300
 270 IF v=6 THEN GO SUB 1130
1057 REM
1058 REM *** Characters present
1059 REM
1060 POKE fklc,io: POKE fklc+1,j
o: LET m=USR who: IF m=1 THEN GO
 TO 1110
1070 LET z$="He can see ": FOR i
=pres+1 TO pres+m-1
1080 LET z$=z$+FN p$(PEEK i)+(",
 " AND m>2 AND i<>pres+m-1)+("an
d " AND m>2 AND i=pres+m-2)
1090 NEXT i
1100 GO SUB 100
1107 REM
1108 REM *** Objects present
1109 REM
1110 LET m=USR what: IF NOT m TH
EN RETURN
1120 LET z$="On the ground nearb
y there is "
1130 FOR i=pres TO pres+m-1: LET
 z$=z$+FN g$(i)
1140 NEXT i
1150 GO SUB 100
1160 RETURN
8007 REM
8008 REM *** Define constants
8009 REM
8010 LET who=64720: LET what=647
82: LET list=64900
8020 LET pres=64811: LET fklc=64
831: LET oblc=64863: LET char=64
945
9998 SAVE "Merlin 2" LINE 8000:
SAVE "mc2"CODE 64500,446
```

By now enthusiastic adventure writers will have saved hundreds of bytes in their programs, and are wondering what to do with all that free space. Why not brighten things up a little with some graphics?

What immediately springs to mind is full colour, hi-res Hobbit-style pictures or umpteen thousand different views around the Land of Midnight. All in good time. Let's not forget the humble ascii character.

What can you do with Uncle's character set? Answer — quite a lot if you've an inventive mind. (Ex-ZX81 users might care to remember the ingenious graphics in Automata's "Can of Worms".) Let me help. Enter the following lines:

10 LET h$ = " E MODE CAPS SHIFT 2 $ " (ENTER)
20 LET b$ = " E MODE CAPS SHIFT 1 E MODE CAPS SHIFT 7 E MODE 1 □□ = = = = = = = = = E MODE 6 E MODE CAPS

RANDOM MEMORY

SHIFT 3 E MODE CAPS SHIFT 9 @ E MODE CAPS SHIFT 7 E MODE 1 E MODE CAPS SHIFT 8 : : E MODE CAPS SHIFT 2 E MODE 7 0 " (ENTER)

Line 30 you can enter normally!

30 LET s$ = CHR$ 22 + CHR$ 17 + CHR$ 22 + h$ +CHR$ 22 + CHR$ 18 + CHR$ 8 + b$ + CHR$ 22 + CHR$ 19 + CHR$ 22 + h$

If you've been following this series you'll know that the strange keying sequences have been incorporating colour and flash control codes into the string. (If you haven't you'll find the table on page 87 of your manual helpful.)

Now RUN. When you get the OK message, try **CLS : PRINT s$,** and you'll have the mystic Sword of Power appear before you, all made with ascii characters complete with flashing Symbol of Gora — probably the best use for that deformed AT sign!

Robot

In a similar way you can produce quite a respectable Robot by printing an "o", "■" or "O" and "I" in a vertical line. The following line produces a bigger version:

10 PRINT "O" : PRINT "■" : PRINT "■" : PRINT "◨" : PRINT "▄"

How about a cache of silver rings? Try RUNning:

10 FOR f = 1 TO 10 : PRINT AT f, 11; PAPER 0 : " (12 spaces) "NEXT f 20 FOR f = 1 TO 30 : PRINT AT RND * 7 + 2, RND * 9 + 12; PAPER 0; INK 7; "o" : NEXT f

Line 10 prints a black background, whilst line 20 prints a random scattering of rings over it. Now CLS, edit line 20 to read:

20 FOR f = 1 TO 30 : PRINT AT f, 11; INK 2; "□"

and RUN 20 and you have a find of "Blood-Gold".

Jewels need a slightly different technique. For a hoard of diamonds replace line 20 with:

20 FOR f = 1 TO 80 : PLOT RND * 80 + 96, RND * 64 + 96 : NEXT f

and RUN. (If you want rubies, set INK to 2 and RUN 20)

Before leaving the ascii codes let's look at the OVER command. This PRINTs one character on another without blanking it out as normally happens. It works in a rather strange way. INK on INK gives PAPER colour, as does PAPER on PAPER, but INK on PAPER gives INK. What this amounts to is that by over-printing characters, new shapes can be produced, sort of pseudo-user defined graphics. So, overprinting * on > gives an aeroplane-like shape, c on o gives a "bullet", and * on ! gives a rocket flame. Try it out for yourself but be warned, there are tens of thousands of combinations!

UDGs

Turning now to real udgs, this opens a completely new spectrum (and without invalidating the guarantee!). You can quite literally produce what you want, where you want it on screen.

As the individual udgs are quite small they really need to be used in groups to create an illustration of any size. This causes a problem. You only seem to have 21 available (Graphic A — U). Even without the manipulation of the machine's memory that we'll look at later, this is not so restrictive as it seems. It is quite possible, with forethought, to use some udgs for more than one purpose. We'll look at this in detail in a later article, but for the present let's rethink Uncle's chessmen udgs (page 72 in your manual). These are far too small to be of any real use, but if they were twice the size it would be a

TABLE A

		INK							
		0	1	2	3	4	5	6	7
PAPER	0	-	8	16	24	32	40	48	56
	1	1	-	17	25	33	41	49	57
	2	2	10	-	26	34	42	50	58
	3	3	11	19	-	35	43	51	59
	4	4	12	20	28	-	44	52	60
	5	5	13	21	29	37	-	53	61
	6	6	14	22	30	38	46	-	62
	7	7	15	23	31	39	47	55	-

different matter. That causes a problem. There are six pieces, each made up of four udgs. That makes 24, and there are only 21 available. The solution to the problem is quite simple. Use two as the base, and link these with different tops for each piece. This way you will only need 6*2+2=14 udgs, leaving some spares. (So purists could have a smaller base for their pawns.)

But you're not actually restricted to just 21 udgs. You can have as many as you like (at a cost of eight bytes each), provided you inform the machine of the fact. Amongst those mysterious Systems Variables, the "house-keeping" file of the machine's memory, there is one called UDG at addresses 23675 and 23676. The information these hold is the address of the first udg byte.

If you: **PRINT USR "a"** (ENTER) you'll get the number 65368 on screen (on a 48K Spectrum). If you: **PRINT PEEK 23675, PEEK**

Clyde Bish shows you how to get more out of your UDGs.

23676 (ENTER) you'll see the numbers 88 and 255. This is the way the machines holds numbers larger than 255. If you multiply 255 by 256 and add 88 you'll get that 65388 again.

If you POKE the UDG System Variable with other members you will cause the machine to look elsewhere for the start of the udgs, and you can do this as often as you like. Type in Program 1. (The capitals in line 200 are udgs and must be entered in Graphics mode.) Now RUN.

The first section sets up a udg file of triangle shapes at a new address, 60000. The second section redirects the UDG systems variable to this address, before the udgs are printed as normal. You're still limited to a maximum of 21 udgs at a time, but you can have as many sets as you like, simply by redirecting UDG to the start of each set required.

Graphic adventures

You could use this idea to illustrate each of your intrepid Adventurer's finds by a 5 column by 4 row graphic. To use this system, first design your illustration on squared paper, sorting out your INK and PAPER colours as well, plus BRIGHT or FLASH if you need them.

The easiest way to translate your masterpiece into a form the computer can understand is by using the Character Generator program on your "Horizons" tape. Construct each character, working from left to right along each line in turn, then SAVE the set, with an appropriate name, using that option. Note that all 20 characters have to be used each time even if they are just blank spaces. Also that you don't need to bother about the 21st character. It's not used.

Now you have to make all those saved udg sets — you can have up to 30 if you start at address 60000 as above — into one long length of code. You can do this by using Program 2. Type it in, then RUN. Answer the prompt with the name of the first set, then load it in. After loading, the program will ask for the attributes value of each udg in turn. Work this out using Table A. For example, for black INK on green PAPER you would enter 33. Add 64 to make it BRIGHT, and 128 for FLASH. (Remember you can only have one INK and one PAPER colour per character.) You'll see each udg displayed change to the attribute value so you can see what the final result will be. Now repeat the process with the second udg set, and so on until the last set has been dealt with, then reply to the prompt with 0 and you'll be able to SAVE the whole collection of udg and attribute bytes from address 60000.

This subroutine to make use of this code in your adventures is given in Program 3. Type this in and RUN 9999. This sets up a string variable g$ as the complete illustrations with the udgs in the correct places to start printing at row 10, column 0. When you get the OK message delete 9999. This information is now in the Variables area in memory and you don't need the line taking up valuable space.

You will need a statement like line 100 in your program wherever you want to call an illustration to screen. The Variable f$ holds the information for the illustration number (in this case 1 — it has to be three figures) followed by the title — A Boot.

The subroutine starting at line 1000 uses this information to do all the hard work. Line 100 itself is interesting. Remember you have to tell the system variable UDG where the udgs start in that strange two-number form we looked at earlier. This line takes the illustration number, multiplies it by 180 and adds 59820, so picture 1 begins at 60000, picture 2 at 60180, picture 3 at 60360 etc. This value resets another Systems Variable called SEED using RANDOMIZE in the two-number form UDG needs, so when you PEEK it, the values needed are there. The rest of f$ is printed under the picture.

So far the program has only printed the picture on the existing screen colours for INK and PAPER. Now to get the colours right. The way the subroutine does this is to POKE the attribute values following the udg bytes into the correct addresses in the ATTRIBUTES file. This starts at 22848 with the information for the character at row 10, column 0, and moves across each row, jumping to the next when necessary. This is the function of the nested loops f and n.

Obviously you can have smaller illustrations (or larger ones, but I'll leave you to work that one out). The important point is that they must all be the same dimensions, and print in the same place on screen. Having had a little relapse into using memory, next month we'll look at ways of economising larger illustrations. Happy udg-ing!

PROGRAM 1

```
  10 FOR f=60000 TO 60007: READ
a: POKE f,a: NEXT f: DATA 1,3,7,
15,31,63,127,255
 200 POKE 23675,96: POKE 23676,2
34: PRINT "AAAAA"
```

PROGRAM 2

```
  10 LET g$=CHR$ 22+CHR$ 10+CHR$
 0+"ABCDE"+CHR$ 13+"FGHIJ"+CHR$
13+"KLMNO"+CHR$ 13+"PQRST"
  11 REM Capitals are udgs.
         Enter in G mode
  15 LET s=60000: LET c=1
  20 INPUT "Title of code ";(c);
t$
  30 IF t$="0" THEN GO TO 200
  31 IF LEN t$>10 THEN GO TO 20
  32 LET c=c+1
  35 LOAD t$CODE s,160
  40 RANDOMIZE s: POKE 23675,PEE
K 23670: POKE 23676,PEEK 23671:
PRINT g$
  50 LET k=0: FOR f=22848 TO 229
44 STEP 32
  60 FOR n=0 TO 4: LET k=k+1: PO
KE f+n,7
  70 INPUT "Attribute value? ";v
  75 IF v<1 OR v>255 THEN GO TO
70
  80 POKE f+n,v: POKE s+160+k,v
  90 NEXT n: NEXT f: LET s=s+180
 100 PAUSE 100: CLS : GO TO 20
 200 INPUT "Title for code? ";t$
: IF t$="" OR LEN t$>10 THEN GO T
O 200
 210 SAVE t$CODE 60000,c*180
 220 VERIFY t$CODE
```

PROGRAM 3

```
 100 LET f$="001A Boot": GO SUB
1000: STOP
1000 LET c=VAL f$( TO 3)*180+598
20: RANDOMIZE c: POKE 23675,PEEK
 23670: POKE 23676,PEEK 23671: P
RINT g$;f$(4 TO ): LET c=c+160:
FOR f=22848 TO 22944 STEP 32: FO
R n=0 TO 4: POKE f+n,PEEK c: LET
 c=c+1: NEXT n: NEXT f: RETURN
9998 REM Capitals in 9999 are
         udgs.Enter in G mode
9999 LET g$=CHR$ 22+CHR$ 10+CHR$
 0+"ABCDE"+CHR$ 13+"FGHIJ"+CHR$
13+"KLMNO"+CHR$ 13+"PQRST"
```

SHORT CUTS

This is the first showcase of readers' short routines. There's a £10 prize for each published routine so if you've got a novel, useful or eccentric mini program for the Spectrum or QL why not submit it to Short Cuts?

Sound Kit

B. J. Kamphuis has been a regular contributor to ZXC for many moons, this neat little routine extends the Spectrum's beep in a simple and easy way.

It is located at address 32000 to allow it to work on 16K machines (are there still any around?) but can be relocated to any address. I would suggest 60000 and to do this change line 30 to CLEAR 59999 and all numbers 32000 to 60000.

To use it in your own programs include lines 10 to 70, you can of course put them as a subroutine at the end of your program, and place your program at lines 100 onward.

The lines 100, 110 and 120 are there to demonstrate some of the sounds.

To use the code RANDOMIZE USR 32000 (or 60000 or whatever address you used) and follow it immediately on the same line with :REM !x,y,z

The x and y are the length of the note and can be any of the Spectrum's numbers, letters or keywords.

The z is the pitch of the note and the only restriction is that the CODE of the z value is GREATER or EQUAL to that of the CODE of the y value.

Note that an exclamation mark must also follow the REM.

```
  10 DATA 42,93,92,35,35,126,254
,33,192,35,126,214,31,95,22,0,35
,35,125,35,35,190,208,214,31,71,
126,214,31,111,38,0
  20 DATA 197,229,213,205,181,3,
209,225,193,43,16,244,201,9999
  30 CLEAR 31999
  40 LET c=32000
  50 READ a: IF a=9999 THEN  GO
TO 100
  60 POKE c,a: LET c=c+1
  70 GO TO 50
 100 RANDOMIZE USR 32000: REM !
RETURN ,■, COPY
 110 RANDOMIZE USR 32000: REM !9
,■, COPY
 120 RANDOMIZE USR 32000: REM !
RETURN ,z,■
```

Characters

Jasper Visser sent us this short (as we like 'em) routine to print in a rather original style on the screen. Type it in and give it a try!

```
   1 REM characters
 100 LET L=0: LET H=0
 130 INPUT "A WORD PLEASE.."; LI
NE A$
 140 IF LEN A$>10 THEN  PRINT AT
 10,0; FLASH 1; BRIGHT 1;"1-10 C
HARACTERS !!": PAUSE 50: PRINT A
T 10,0;,,: GO TO 130
 150 PRINT AT 0,0; INK 7;A$
 160 FOR A=0 TO LEN A$*8
 170 FOR B=175 TO 168 STEP -1
 180 IF POINT (A,B)=1 THEN  GO S
UB 220
 190 LET H=H+3: NEXT B: LET H=0:
 LET L=L+3: NEXT A
 200 PRINT AT 0,0;,,
 210 STOP
 220 PLOT L,50-(H+3): IF POINT (
A-1,B)=0 THEN  DRAW 0,3
 230 PLOT L,50-H: IF POINT (A,B+
1)=0 THEN  DRAW 3,0
 240 PLOT L+3,50-H: IF POINT (A+
1,B)=0 THEN  DRAW 0,-3
 250 PLOT L+3,50-(H+3): IF POINT
 (A,B-1)=0 THEN  DRAW -3,0
 260 RETURN
```

Security Program

Dean Carpenter is getting paranoid about protecting his program, and who can blame him with all those would be Captain Hooks around.

Add it to your program, either at the start as printed or as a subroutine, and autostart it by saving it using a LINE number ie. SAVE "mygame" LINE 5.

Notice the unusual POKEs at the start which, unlike the usual Poke of 23659,0 which will not allow the use of INPUT, only crashes if an error report is thrown — ie. someone tries to break into the program. Another first for ZXC?

Change the password by changing the letters YOUR CODEWORD in line 30, it may be wise not to use anything too complex, after all, you've got to remember it!

Keep those short cut programs coming!

```
   1 REM Security Program
   5 LET OK=0: POKE 23613,0: POK
E 23614,0
  10 BORDER 0: PAPER 0: INK 7: C
LS : PRINT AT 5,0;"PLEASE ENTER
ACCESS CODE:-": INPUT  LINE A$
  30 IF A$="YOUR CODEWORD" THEN
 LET OK=1
  40 CLS : PRINT  FLASH 1; BRIGH
T 1;AT 2,11;"CODE "+("IN" AND NO
T OK)+"CORRECT"
  50 IF NOT OK THEN  PAUSE 150:
PRINT AT 10,0;"YOU ARE DENIED AC
CESS"; FLASH 1; BRIGHT 1;AT 20,0
;"PROGRAM TERMINATED": PAUSE 150
: RANDOMIZE USR 0
  60 PRINT AT 10,0;"PLEASE INPUT
 YOUR NAME:-": INPUT  LINE N$
  70 PRINT AT 16,2;"WELCOME TO T
HE SYSTEM, ";N$
```

ZX-COMPUTING

S★U★P★E★R★B★O★W★L

Time to don your shoulder pads and helmet as Ocean get on the grid iron with a simulation of American football.

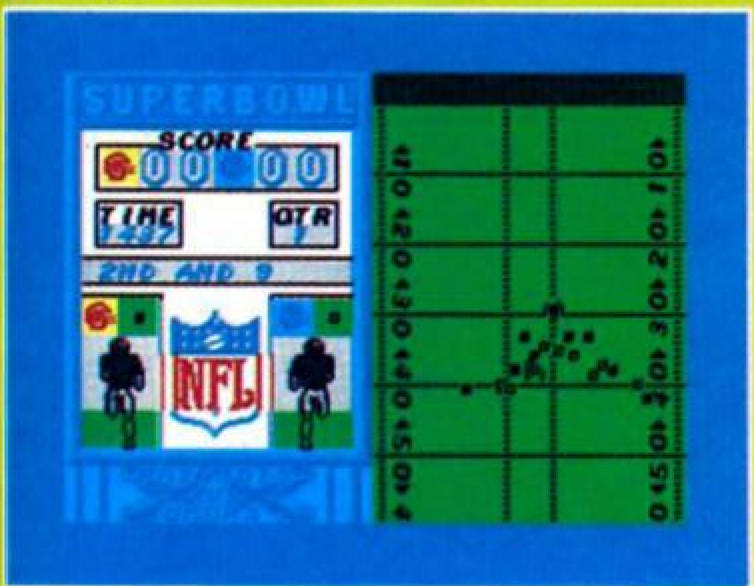
Superbowl
Ocean
£9.95

If you enjoy the balletic bonecrunching spectacle of American football but are confused by its complexities you may think twice about buying a simulation of the game.

However with this well presented package every attempt is made to enhance your enjoyment and understanding of the game whether you are approaching it as a total novice or an expert.

A 15 minute cassette explaining the rudiments of American football rules is a sensible inclusion for those who don't know their split ends from their tight ends.

The simulation is actually a replay of the 1986 Superbowl between the Chicago Bears and the New England Patriots and is designed very much to be a two player game.





There is however an option to play the game against the computer to acquaint yourself with the basic moves before tackling an opponent. Defensive and offensive menus for deciding strategy include a play game option where the opposing side will play automatically.

This option is highly recommended to get a feel of the game and achieving touchdowns is relatively easy but don't be lulled into thinking that it will be as simple in a competitive game.

The screen display is divided into two halves. On the right is a scrolling map of the grid iron with your team formations symbolised by squares. Although these are tiny a useful aid is added as your controlled player or nominated receiver becomes an outsized square as you propel him around the pitch.

Once a play has begun it can be difficult to tell just what is going on and this is where the display on the left hand side comes in showing large animated figures replaying the vital moves — a successful pass, a fumble, a touchdown or a tackle. The display also tells you who is in possession, something that is not always apparent from the overview of the pitch.

If you are on the offensive there is a list of options that appears before each down, including:

Long pass, short pass, rush play or special play (these plays being field goal attempt and punt). Each option leads to other more sophisticated strategies to choose from.

Once you have decided on your strategy you have the chance to see what will happen to your players by using the view next frame option. Then it's time to select your preferred receiver who will hopefully collect the pass from the quarterback.

Then it's the defensive team's chance to organise with a choice of formations, 3-4-4, 7-1-3 etc. and to nominate which of the defensive line will mark each attacking player. The defence team also has a nominated roving player who can create mayhem under joystick control and there is an option to change this player once play has commenced.

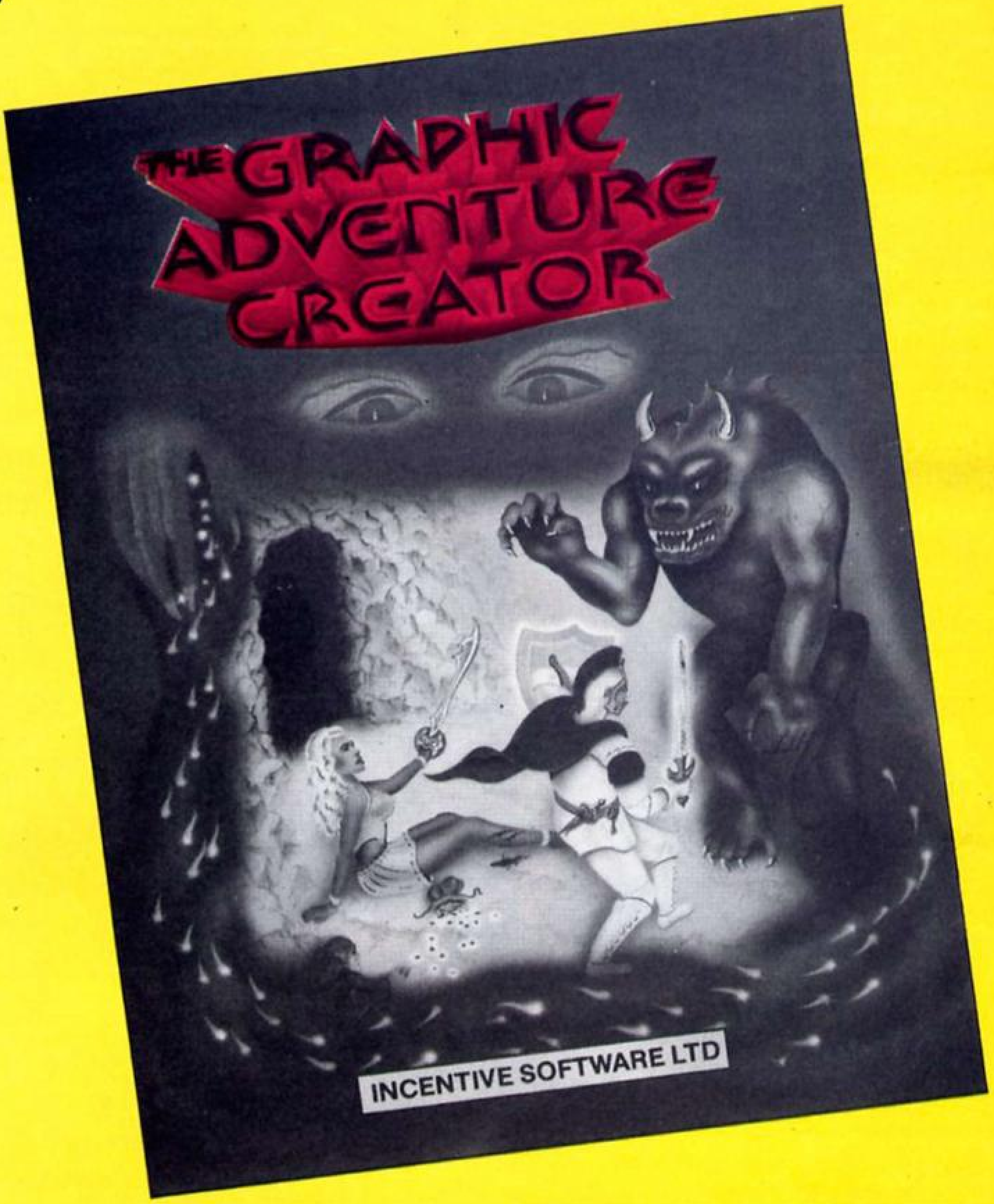
Passing can be very tricky. When the ball is snapped back to the quarterback he is under joystick control. Once you've decided who will receive the ball (the cursor can be moved over potential receivers when you press the fire button) release the fire button and the ball speeds on its way to the receiver who comes under your control once the ball is released. Passing is difficult to master but it's well worth persisting with.

If you successfully position your receiver you are on the way to a touchdown but if there is a fumble you can renominate a receiver to retrieve the ball or protect your man once he is in possession. When a pass goes wrong however it is very hard indeed to avoid losing possession.

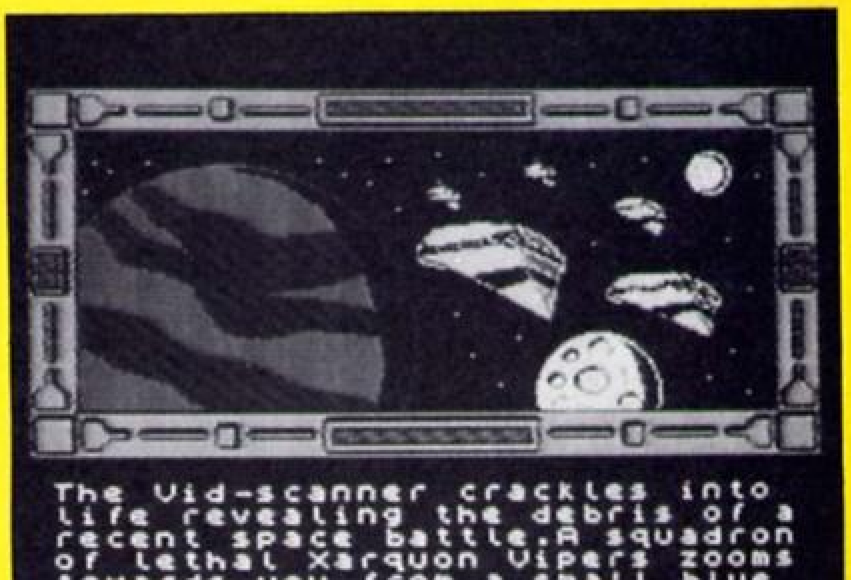
Playing Superbowl can be as complex and strategically advanced as you choose to make it. Although it is a two player game there is only an option to use one joystick, the other player having to be content with keyboard control. If you want to keep things even both players can use the keyboard.

It would be difficult to imagine a better simulation of the game and its success comes from the fact that it is not a poor imitation of the real thing but within its limitations tries to give a flavour of the game at its highest level. The biggest compliment is really that this simulation, because it is well presented and simple to get to grips with, will, if persevered with, help you to understand and enjoy the real thing to a greater extent.




THE GRAPHIC ADVENTURE CREATOR
INCENTIVE SOFTWARE LTD


Bright sunlight dazzles you as you approach the entrance of the Pharoah's tomb. A small sphinx stands before you.it's eyes appearing to follow you making you feel uneasy and restless...
What now..?


The Vid-scanner crackles into life revealing the debris of a recent space battle.A squadron of lethal Xarquon Vipers zooms towards you from a small blue moon.
What now commander..?

Why just play adventures when you can troll your own with Incentive's Graphic Adventure Creator.

It's been quite a long time coming, but at last there's some competition for Gilsoft's Quill.

Incentive Software are just putting the finishing touches to the Spectrum version of their Graphic Adventure Creator (GAC to its friends, of whom there could soon be quite a few), and Ian Andrew dropped by recently to show us how it worked.

Loading up GAC takes you into the main menu, where there are various options leading to the different parts of the program that you'll need for constructing your adventure. These include the graphics editor, conditions menu (where you assemble the conditions required to solve the puzzles in the game), room descriptions and so on.

GAC does not confine you to simple verb/noun commands as so many adventures do (Quilled and otherwise), and features a sophisticated command interpreter that will accept complicated, multi part commands. For instance, the example that the manual gives deals with the command — "Get the gold, examine it, put it in the box then go north." The program can hold a vocabulary of over 750 words, allowing you plenty of scope for whatever warped schemes you might think up. And when it comes to writing location descriptions, Ian Andrew told us that GAC's text compression routines should allow you to cram in up to 30% more text than The Quill.

But of course it's the graphics creating ability of GAC that will be one of its most immediately attractive features. With GAC you can draw location graphics in tasteful shades of gold, pastel magenta and sea green. These pictures occupy the top two thirds of the Spectrum's screen display and can be drawn for any location that you choose. Rather than taking up about 4K of memory the way a picture that size would normally do, GAC stores the pictures as a series of commands for performing specific functions, and these take up considerably less space than a normal SCREEN$ would.

GAC's graphics editor includes commands for drawing lines, dots, rectangles, circles and ellipses and over 20 different colours for creating shading effects. Altering the pictures is simple as the editor allows you to step quickly through the commands that make up each picture, and you can even store a number of standard shapes for repeated use rather than having to draw them separately each time you want to use them.

From watching Ian's demonstration, it looks like GAC is not only highly versatile, but also simple to use, and could well give rise to a whole new generation of GACed adventures alongside all those Quilled ones once all you budding adventure writers get to grips with it (and there is already one software house waiting for the Spectrum version to be released so that they can convert a game that was written with the Amstrad GAC).



Incentive themselves intend to start up their own Medallion Adventure range, which will consist of the best GACed adventures submitted to them by authors (although they place no restrictions on anyone who writes an adventure and tries to get it marketed by other companies).

Competition

If you want to get your hands on a copy of the Graphic Adventure Creator and get started on writing your own version of The Hobbit, here's your chance. Incentive Software are offering ZX readers a chance of winning a shiny new GAC in this competition.

There are 10 GACs to be snapped up and what we'd like you to do is think of how you would start off the adventure that you would write with your copy of GAC, and then write down the first location description that a player would be presented with. Remember, the start of an adventure is the place where you whet the player's appetite and present him with a taste of the mysteries and intrigue that lie ahead. So, just writing "You are in a dark room with a door facing east" would be pretty uninteresting. But something along the lines of: "You are in a locked room. Six foot away is a scorpion which slowly inches towards you, and from the roof above row upon row of deadly, glistening spikes are descending." Is a bit more likely to get the adrenalin going, though obviously you can add a few objects and exits or anything else that might occur to you. And just to make things a little harder, you've got to keep your description to less than 50 words.

Send your entry, on the coupon printed here, in to GAC Competition, ZX Computing Monthly, 1 Golden Square, London W1R 3AB. The competition is open to all readers of ZX Computing Monthly except employees of Argus Specialist Publications, Alabaster Passmore and Sons and Incentive Software. Entries must arrive by first post on 8th August 1986 and the Editor's decision is final.

GAC Competition

My adventure would begin: ....

....

....

....

....

....

....

....

Name ....

Address ....

....

....

Send your entries to: GAC Compeition, ZX Computing Monthly, 1 Golden Square, London W1R 3AB. Entries to arrive by first post on 8th August.

ELEMENTARY GRAPHICS

Toni Baker begins a three part series on mastering machine code graphics.

When we use the word "Graphics" we usually think of producing complex, and possibly moving or 3D effect pictures on the screen — but graphics doesn't necessarily mean that. Something as simple as PRINT "*"; is utilising graphics — and in machine code if you don't understand how to do the simple things then the more intricate designs will remain beyond you.

By "Graphics" I mean the process of altering the image on the TV screen in any way at all. This three part series is intended to cover the bare necessities of machine code graphics. In future series' I may go on to the cleverer stuff, but for now this is a beginners' course — an apprentice course.

The first things we need to know about are streams and channels. A "Stream" is computer jargon for "A small river", whereas a "Channel" is what we computer experts call "A narrow sea". These nautical references are, I confess, difficult concepts to master when viewed in the context of the ZX Spectrum, but the words are taken from the conventional English words of the same spelling; a stream (a number between zero and fifteen to index input and output) and channel (a device such as a printer or a TV screen). I hope

Listing 1

```
FIGURE ONE

(Program a)

FD360200  DEMO_S   LD (TVFLAG),00     Reset bit zero of TVFLAG.
3E2A      LOOP     LD A,"*"           A: contains the ASCII code for "*".
D7                 RST 10             Print CHR$(A); to the current channel.
18FB               JR LOOP

(Program b)

FD360201  DEMO_K   LD (TVFLAG),01     Set bit zero of TVFLAG.
3E2A      LOOP     LD A,"*"
D7                 RST 10             Print an asterisk.
18FB               JR LOOP

FIGURE TWO

FDCB01CE  DEMO_P   SET 1,(FLAGS)
0600               LD B,00            Prepare for 256d asterisks.
3E2A      LOOP     LD A,"*"
D7                 RST 10             Print an asterisk.
10FB               DJNZ LOOP          Repeat till finished.
C9                 RET

FIGURE THREE

3E02      GEN_S    LD A,02            A: contains desired stream number.
CD0116             CALL 1601,CHAN_OPEN
                                      Select this as the current stream.
3E2A      LOOP     LD A,"*"
D7                 RST 10
18FB               JR LOOP
```

I've made that clear.

We need to know about them because although you can forget them altogether in BASIC if you want to, in machine code they are of paramount importance. Because:
INPUT "HELLO";A$ is the same thing as PRINT#0;"HELLO";:INPUTA$
PRINT "HELLO" is the same thing as PRINT#2;"HELLO"
LPRINT "HELLO" is the same thing as PRINT#3;"HELLO"

The point is that all printing — whether to the main screen, the lower screen (ie the bottom two or more lines normally used for INPUT items) or to a printer — are as far as the machine code programmer is concerned, identical. In the BASIC statements above, the number after the "#" symbol is the stream number. Since we usually only ever need to print to the screen or the printer, or to the lower screen (when creating a INPUT prompt) the stream number (in BASIC) does not normally need to be included — hence we usually use the format on the left. In machine code all is different. The stream number is essential, and must be specified:
Stream # 0 refers to channel "K" — the lower screen
Stream # 1 refers to channel "K" — the lower screen also
Stream # 2 refers to channel "S" — the main screen
Stream # 3 refers to channel "P" — the printer

Although the channels which these stream numbers refer to may be altered by the OPEN # command, to do so is not very usual. I shall therefore assume they have not been altered, and shall continue to use #0 for the lower screen, #2 for the main screen, and #3 for the printer.

Now — as you know — a computer can only ever do one thing at a time. This means it can only ever print one thing at a time. It can't print both to the screen and to a printer simultaneously. For this reason it can only ever need to use one channel, and hence one stream, at a time. The stream it is using at any particular moment is called the current stream, and likewise the channel being used is the current channel.

When we call a machine code subroutine the current channel is unchanged. This means that the current channel remains as it was the last time any printing or editing was done. Usually we find this is channel "K" (the lower screen), but it may not be.

Assuming that your program hasn't used the printer (or a microdrive or network, etc) since the last time you entered a command (eg RUN) or input something, then the current channel will still be either "K" or "P". I'm going to show you an ingenious little trick to switch between the two. You see the only difference between these two channels is bit zero of the system variable TVFLAG. This bit is reset for channel "S", and set for channel "K". This means that we can switch between channels "S" and "K" just by changing this bit. To demonstrate, try running the two programs of Figure One to see exactly what difference the first instruction makes. (Incidentally, the values of the remaining bits of TVFLAG are irrelevant at this point.)

Another trick is to switch between channels "K" and "S", and channel "P". Again only one bit is needed to tell the difference. Bit one of the system variable FLAGS is reset for channels "S" and "K", but set for the ZX Printer. The program of Figure Two will print to the ZX Printer using this simple trick. (But WARNING — The SPECTRUM 128 does not allow the use of the ZX Printer when in 128K mode. The program (Figure Two) must not be run on a Spectrum 128 in 128K mode or it will cause a crash!)

But now for the general case — and this will work on a Spectrum 128 in 128K mode. We may change the current channel by selecting a new stream number. All we have to do is to load the A register with the desired stream number, and call a simple ROM subroutine. Figure Three shows this being done to select the screen as the current channel. Remember that this will always work, irrespective of whichever was previously the current channel. Users of the Spectrum 128 should note that when they are in 48K mode channel "P" is the ZX Printer, but when in 128K mode channel "P" is the built-in RS232 interface at the left hand side of the Spectrum case. It is safe to select channel "P" (ie to select stream number three) in either case by this method.

All of this is essential to know because Spectrum printing is achieved with the machine code instruction RST 10, and RST 10 will only print to the *current*

Listing 2

```
FIGURE FOUR

(Program a)

3E16    AT_5_4   LD A,16
D7               RST 10      PRINT AT ...
3E05             LD A,05
D7               RST 10      5, ...
3E04             LD A,04
D7               RST 10      4;

(Program b)

3E16    AT_D_E   LD A,16     PR
D7               RST 10      PRINT AT ...
7A               LD A,D
D7               RST 10      D, ...
7B               LD A,E
D7               RST 10      E;

FIGURE FIVE

3E17    TAB_E    LD A,17
D7               RST 10      PRINT TAB ...
7B               LD A,E
D7               RST 10      E ...
AF               XOR A
D7               RST 10      ;
```

channel. It is vital that you tell the computer where and how you want to print before you tell it what to print.

RST 10

You can use the machine code instruction RST 10 to print any single character, be it an ASCII character, a graphics character, or a token. Simply load the A register with the code of the character and then execute RST 10. Note that ordinary characters when printed occupy only one print position, but keyword characters between A5 and FF (between A3 and FF on the Spectrum 128 in 128K mode) are expanded and printed in full, using as many print positions as there are letters in the keyword. In all cases RST 10 leaves all registers (except BC', DE', and possibly A) unchanged.

PRINTING NUMBERS

Single digits between 0 and 9

To print a number between 0 and 9 either load A with the number and CALL OUT_CODE (at address 15EF) (NOTE: this corrupts the E register), or load A with the ASCII code for the digit and use RST 10. Note that ADD A,30h/RST 10 uses exactly as many bytes as CALL OUT_CODE, but does not corrupt the E register.

Integers between 0 and 9999

To print a positive number less than 10000d (or zero) simply load the number into the BC register pair and CALL OUT_NUM_1 (at address 1A1B).

Integers between 0 and 65535

Two subroutine calls are required this time, once the integer has been placed in the BC register pair. First CALL STACK_BC (address 2D2B), then call PRINT_FP (address 2DE3). STACK_BC pushes the number onto the calculator stack, and PRINT_FP is a general purpose routine to print any number.

Negative integers

Print a minus sign (by loading A with 2D and using RST) then print ABS of the integer using one of the methods described above.

All floating point numbers

Since it is not possible to store a full floating point number in a single register or register pair it follows that a floating point number can only arise as a result of using the calculator (see separate series in this magazine). In such a case, the number to be printed should be left at the top of the calculator stack, and then CALL PRINT_FP (address 2DE3). In addition to printing the number the PRINT_FP subroutine will also delete the floating point number from the calculator stack. (Warning: If the number is strictly between −1 and +1, zero excluded, then a bug in the ROM causes an unwanted zero to be left on the calculator stack at this point).

PRINTING STRINGS

There are (at least) three different ways to print a string. In each case the text of the string must be stored at a fixed location in the Spectrum's memory. The first method of printing strings is also the simplest. DE must point to the first character of the string, and BC must contain the length of the string. Then simply CALL PR_STRING (at address 203C).

Secondly, note that a string can arise as a result of using the calculator, in which case the string can be made to appear at the top of the calculator stack. In this case it is possible to print it straight from the stack by the procedure CP A followed by CALL PR_STR_1 (address 2036).

Thirdly, it is possible to print the (A+1)th string in a table of strings. DE must point to the byte before the first character of the first string — the byte pointed to must be between 80 and FF. Neither graphics characters nor token keywords are allowed in such a string. Each string in the table must be non-empty, and must be terminated by the last character of the string having bit seven set. Assuming such a table has been constructed and registers A and DE assigned accordingly, the required string may be printed by CALL PO_MSG (at address 0C0A).

Things to watch out for

Note that if, at any stage, one of the predefined graphics characters (whose code is between 80 and 8F) is printed, then system variable addresses 5C92 to 5C99 will be corrupted. This corrupts calculator memories zero and one (see calculator series)). This is totally unimportant unless you are either using the calculator or storing information in these variables.

Also — if the subroutine PRINT_FP is called then all six of the calculator's memories will be corrupted — that is the whole of the system variable MEMBOT (addresses 5C92 to 5CAF). Again this is totally unimportant unless you are using the calculator memories or storing information in this area.

Finally, note that the system variable MEM normally contains the address of MEMBOT. If the value of MEM has been altered (this is highly unlikely but I include it for sake of completeness) then PRINT_FP will not work correctly.

The control characters

In the Spectrum character set codes 20 to 7F are ASCII characters and codes 80 to FF are graphics characters and keyword tokens. This leaves the codes 00 to 1F. These are control characters, and can be used to perform PRINT AT and stuff like that.

Control 16h is the at control (not to be confused with the keyword AT which has code ACh). Control codes are operated by loading the code

Listing 3

```
FIGURE SIX

3E10    DEMO    LD A,10
D7              RST 10          PRINT INK ...
3E02            LD A,02
D7              RST 10          2; ...
3E11            LD A,11
D7              RST 10          PAPER ...
3E06            LD A,06
D7              RST 10          6; ...
3E2A            LD A,"*"
D7              RST 10          "*";
```

into the A register and using RST 10. This means that they may be "printed" just like any other character, and may be included in strings. AT needs two parameters, and the control code is no exception. The two parameters must be specified, in the right order, and these too must be "printed" with RST 10. Figure 4(a) shows the at control code being used to simulate PRINT AT 5,4;

Nor does it matter how many machine code instructions are executed between the three occurrences of RST 10. The Spectrum will always "remember" that the next two RST 10's will be at parameters.

The use of the at control character plays its most useful role when we want to PRINT AT a variable location. Figure 4(b) will simulate PRINT AT D,E;

The next control code we meet is **tab**, which is control 17h. This control code also requires two parameters: the low byte; followed by the high byte, of the required TAB column number. Of course, on the screen (and the ZX Printer) there are only thirty-two columns — any number higher than thirty-one is reduced to a number between zero and thirty-one by continually subtracting thirty-two from the number. This means that, effectively, the high byte is irrelevant (since 256d is a multiple of 32d). This is not necessarily true when you print to a printer other than the ZX (ie via the RS232 interface). For this reason, the second TAB parameter may only be considered arbitrary if it is known in advance that the output will be sent to the screen or the ZX Printer. Figure Five shows the **tab** control code in action. Here I have considered the second byte to be important (just in case) and so have assigned it with a correct value of zero. Normally, however, the XOR A instruction could have been omitted.

The **comma** control (code 06) may be used to simulate PRINT , (ie TAB to column 0 or column 16d) — it requires no parameters at all — simply load the A register with 06 and use RST 10.

The **enter** control (code 0D) may be used to simulate PRINT ' (ie print a new line, which has the effect of moving the print position to the start of the next line). Again, all we need do is load the A register with 0D and use RST 10.

RST 10 is a very versatile instruction. Not only will it do all I have described above, but it can also be used to change the PAPER and INK colours, and so on, just like in a BASIC PRINT statement. Suppose we wanted to print a red asterisk on a yellow background. The program of Figure Six will do just the job. Note that once the print colours have been selected by this means they remain in force until they are changed, or until the end of the BASIC statement which called the machine code. Figure Seven shows all the control codes and what they do, and what parameters they need.

Alternatives

For channels "K", "S" and "P" (the ZX Printer) it is possible to achieve PRINT AT / PRINT TAB / PRINT , without using control codes at all. Here's how:
PRINT AT B,C; can be achieved by CALL AT_B_C (address 0A9B)
PRINT TAB A; can be achieved by CALL TAB_A (address 0AC3)
PRINT , can be achieved by CALL PO_COMMA (address 0A5F)

There is also a rather easy way of changing both the paper and ink colours at the same time. In fact this method will also specify the current bright status and flash status while you're at it. All you have to do is to change one system variable — it's called ATTR_T. Simply construct an attribute byte with your required combination of colours and load it into this variable. For instance, the single instruction LD (ATTR_T),07 (FD365507) will change the colours to paper black/ink white/bright off/flash off. To construct such an attribute byte simply calculate (in decimal) 128*F + 64*B + 8*P + I (where F=flash status, B=bright status, P=paper colour, and I=ink colour).

It is also easy to select "transparent" paper/ink/bright/flash, as you can in BASIC (ie PRINT PAPER 8;). You can do it either with control codes, or by this method: Decide which of paper/ink/bright/flash you want to be transparent, add up the numbers from the list below, and load the result into the system variable MASK_T.
For INK transparent: 07
For PAPER transparent: 38
For BRIGHT transparent: 40
For FLASH transparent: 80

For instance, the single instruction LD (MASK_T),3F (FD36563F) will assign both paper and ink to be transparent.

Well, that's all from me for this month. Next month I'll continue the series by talking about the process of POKEing and manipulating the screen directly, without involving the use of PRINTing at all. See you then.

Listing 4

CONTROL CODE	PARAMETERS NEEDED, IF ANY
06 comma 08 backspace 0D enter	
10 ink 11 paper	00 black 01 blue 02 red 03 magenta 04 green 05 cyan 06 yellow 07 white 08 transparent 09 contrast
12 flash 13 bright	00 off 01 on 08 transparent
14 inverse 15 over	00 off 01 on
16 at	line number, column number
17 tab	low byte, high byte

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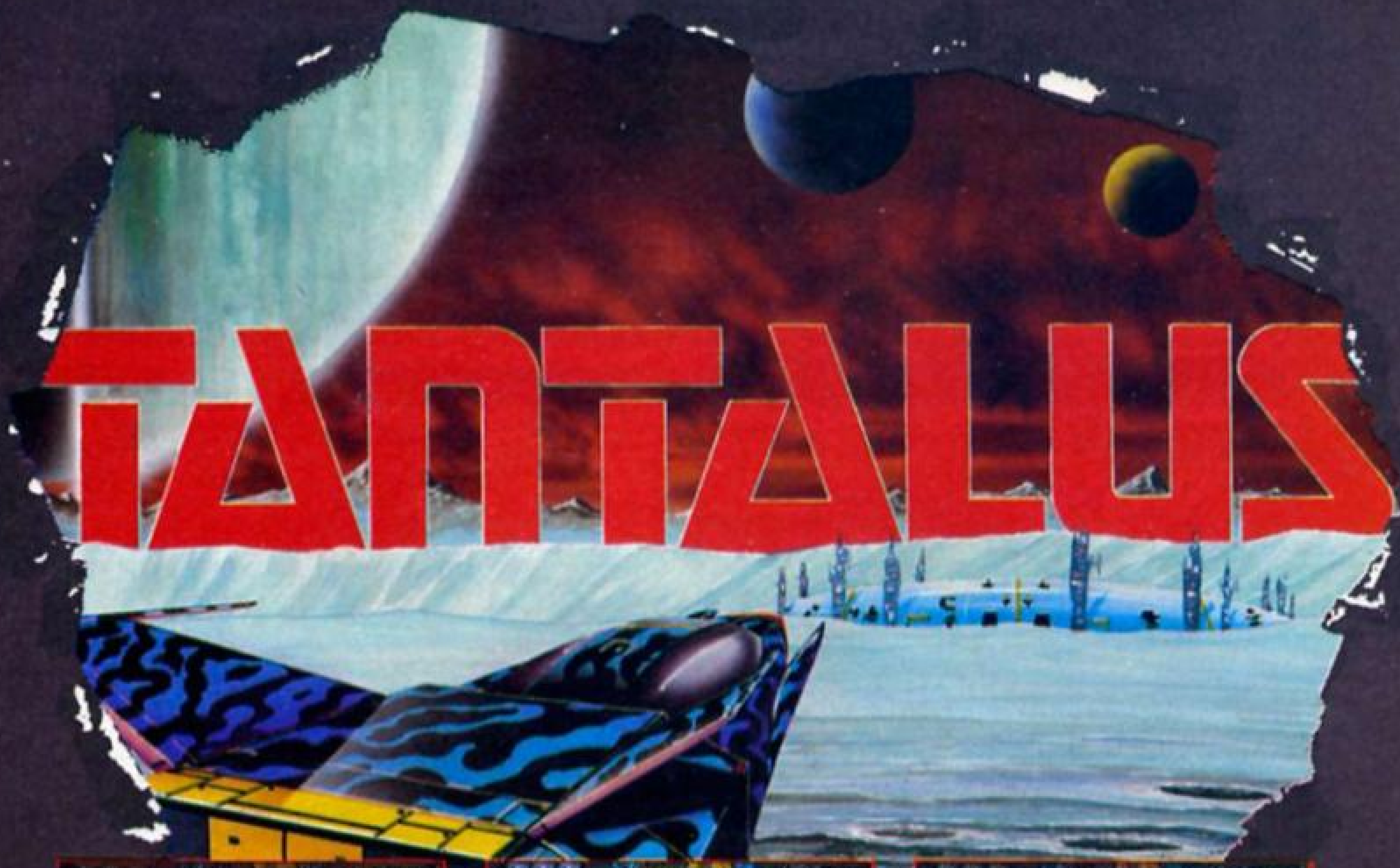
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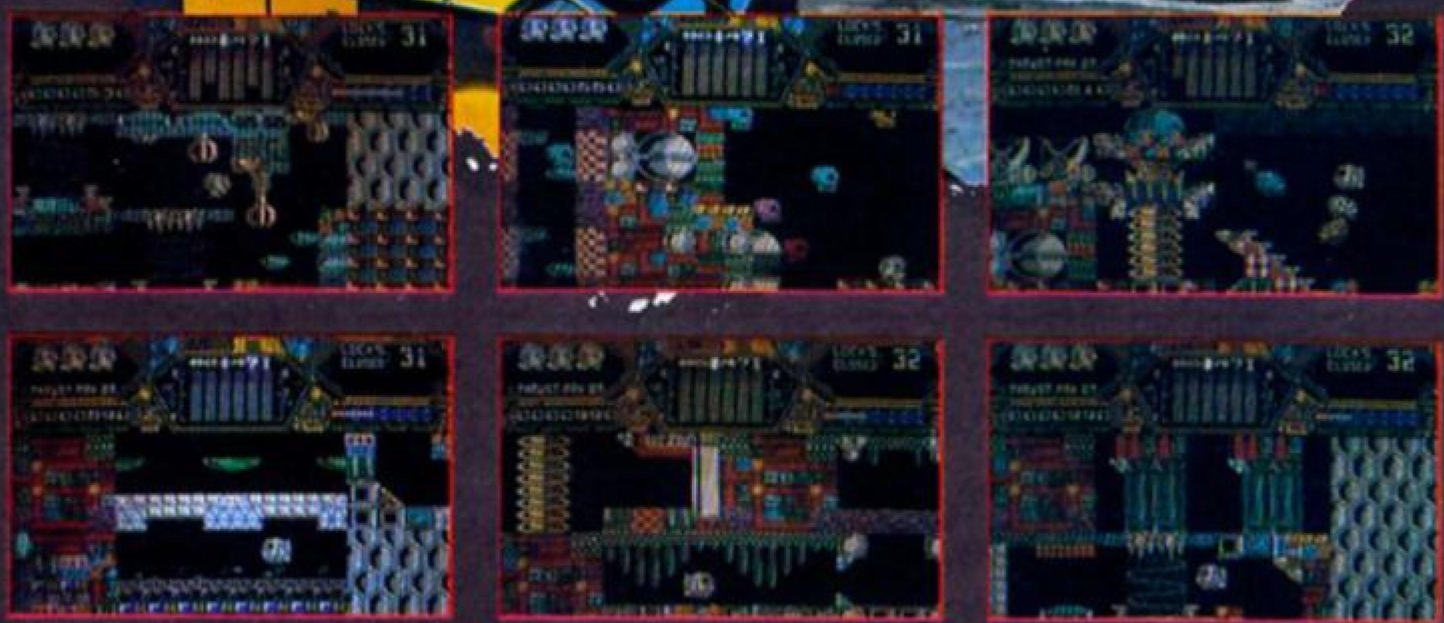
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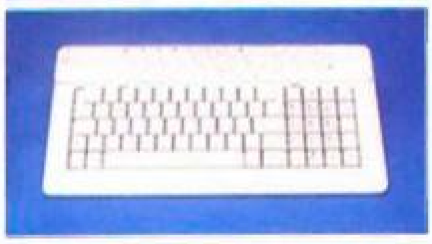
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